AIR Pictorial
and AIR RESERVE GAZETTE

AUGUST, 1956

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1/6

Vol. XVIII No. 8

Advantages of the
ROLLS-ROYCE
CONWAY
BY-PASS TURBO JET
for long range airliners

★

Lower weight giving increased payload

Lower guaranteed specific fuel consumption

Lower first cost and operating costs

Less noise

★

ROLLS-ROYCE AERO ENGINES LEAD THE WORLD

Editor:
FRANK HILLIER

AIR Pictorial and AIR RESERVE GAZETTE

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A.T.C. Reforms

ON 28th June the Secretary of State for Air was asked in the House of Commons if he was aware of the sense of frustration which was growing among officers of the Air Training Corps, owing to their lack of knowledge as to whether any of the recommendations made during the hearings of the Taylor Committee, were to be adopted. The Parliamentary Secretary replied that a statement covering all the recommendations was being distributed that day to all A.T.C. wings.

Before reviewing the Committee's recommendations, which are of the greatest interest and which in fact reflect what most of those acquainted with the A.T.C. at close quarters have long considered essential, it is appropriate to mention that the Taylor Committee was appointed almost exactly a year ago. It reported six months ago, and it has taken all that time for the Air Ministry to study this report and make up its mind concerning it. Although the Committee reported in January, it was not until 16th March that it was presented to the Air Cadet Council, which considered it on that day and at a second meeting a month later.

We have frequently commented in these columns on the slowness of business transacted at the Air Ministry and the fact that it has taken the Air Ministry six months to announce the findings of the Committee, whose report was neither lengthy nor abstruse, indicates that the pace of business in the Air Ministry is certainly not increasing, and is a good deal slower than is necessary and certainly much slower than is desirable.

The Air League was among the individuals and bodies which gave evidence before the Taylor Committee, and was at one with most of them in deploring the over-elaborateness of the A.T.C. administration. It was modelled closely on the R.A.F., with its cohorts of clerks and orderlies, to cope with the mass of paper work, which is the curse of all Service departments. The long chain of administration was also under fire. It is gratifying to know that the main finding of the Committee is that the R.A.F. Groups in Home Command should cease to be responsible for local A.T.C. administration, which is to be entrusted to A.T.C. wings, which would be responsible direct to a Commandant.

The very important question of maintaining the links between A.T.C. units and neighbouring R.A.F. stations has not been overlooked, and means are to be devised to bring this about.

We still believe that it would have been better to have a civilian as Director-General of the A.T.C., because it is to be feared that the tendency will continue, which has been manifest in the last few years, for one of the original important aims of the A.T.C. as laid down by the Air League, its original founder, to be forgotten, that is to say, that it should not be regarded simply as a Service Pre-entry organisation, but should have the wider object of producing not only keen airmen but good citizens. It is also a matter for regret that there is no mention in the report of giving greater responsibility to the local A.T.C. committees. Until this has been done, it is to be feared that difficulty will persist in finding sufficient men of responsibility and standing to join these committees, since such men are naturally disinclined to service on bodies which have no worthwhile function to be performed outside the limited sphere which at present is allotted to them.

However, the excellent report of the Taylor Committee and adoption of its main recommendations will have the effect of bringing about a very considerable economy in the administration of the Corps, which may well reduce its cost to the taxpayer by something like 50 per cent. Had the repeated advice of those in the best position to judge been heeded during the last few years, this happy result could have been obtained a long time ago. Practically all the evils of the present system which were brought before the Committee, have been well known for a long while. It is a pity that action should have been so long delayed.

THIS MONTH'S COVER

A LENGTHENED nose, deletion of the dorsal fin and vortex generators on the outer-wing panels, are the main external differences between the prototype and production Handley Page Victor, which will be introduced into R.A.F. service in the next few months. Photograph is of XA917.

The Case for the Triangle

Some Comments on Delta Wings for High Speed Flight with particular reference to the Fairey F.D.2

By JAMES HAY STEVENS

THE straight-wing and delta schools of thought on supersonic aircraft layout hold views which permit of little or no compromise. It is, too, noteworthy that these two schools appear to be largely eliminating the swept wing as speeds increase beyond about Mach 1.5. There are still certainly two formidable contenders in the U.S. Navy's Chance Vought Crusader and the R.A.F.'s English Electric P.1, but little sign of further examples coming along.

The reasons for the likely demise of the swept wing are mainly structural. In order to keep down the shock-wave drag of the wing in true supersonic flight the thickness/chord ratio has to be reduced to 5 per cent or less. Under these conditions, in order to gain reasonable physical depth for strength and stiffness, it is essential to adopt a low aspect-ratio. Reducing the aspect-ratio of a wing of given area and thickness ratio from 5 to 2 will almost double its physical depth and at the same time reduce the bending forces acting on it—by triangulating the low aspect-ratio planform, the gains in chord and thickness are concentrated at the root. Very low aspect-ratios are not generally popular subsonically because they have a high drag, but this objection disappears in supersonic flight—in fact, the lower aspect-ratio has a slight advantage.

Aspect-ratios of 2 or less—which we are now beginning to see—have peculiar low-speed characteristics. They can reach very high incidence without stalling: in fact, they seem to behave rather like a kite. These angles of attack are not really practical, however, because they would require almost impossible landing gears (remember the Vought V-173 "Flying Pancake"), but they do mean that stability and control on the approach are excellent and there is little chance of stalling the wing through raising the nose too high.

Against this, in the case of the delta, there is the fact that when levelling out for the actual landing, the upward movement of the elevators (i.e. the wing trailing edge, or a large part of it) reduces lift, so that there may be an initial sink before the elevator response takes effect.

The "conventional" swept wing becomes an embarrassment at high supersonic speeds—although at any time it is in the nature of an expedient—because the high loads on the structure exert bending and very adverse twisting forces upon its spars and, in particular, its wing-root fittings. Although the slender wing can just about be made strong enough, it is impossible to make it sufficiently stiff, so that the only solution would be the "judo" technique of the Short Sherpa's isoclinic wing. The swept wing also suffers from lack of area, the key factor in high-altitude manoeuvrability, without an undue drag/aspect-ratio penalty, while it is unlikely to offer much fuel volume. In short, the swept wing would appear to combine the more undesirable features of the thin, straight wing and the delta.

These are, very much in brief, the bare facts on supersonic wing characteristics. The swept wing has been ruled out (though not completely eliminated) above Mach 1.5; it remains, therefore, to discuss the rival merits of thin, straight or delta wing for speeds up to, say, Mach 2—1,300 m.p.h. in the stratosphere. Last month the Lockheed arguments for the F-104 Starfire and its straight wing were given, and to some extent dissected.* It is not, unfortunately, possible to give many of Fairey's reasons for choosing the delta, since Security refuses to allow the company to make technical capital out of its World Speed Record achievement. One may, however, draw quite a few conclusions from an external inspection.

The Fairey F.D.2—some comments

When the Fairey Delta 2 gained the World Speed Record by so large a margin on 10th March, the sudden release of the well-kept secret of its performance astonished most people—but *not* the writer, who had always admired the F.D.2 as a design. It was a fine technical achievement by a company in which high-speed experience had hitherto been restricted to missile work, and it should also be remembered that this is only the second British supersonic man-carrying vehicle.

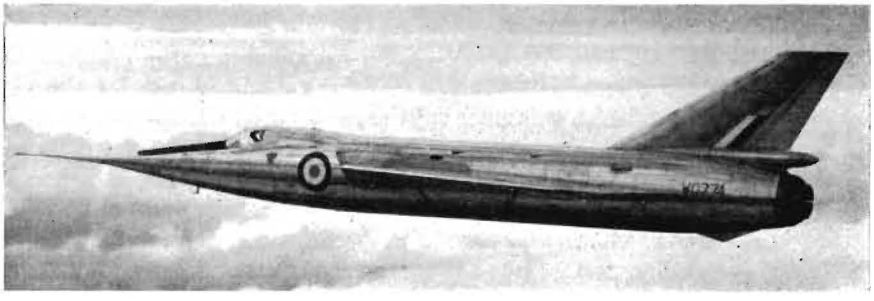
Before commenting upon the design features of the F.D.2 a brief statement of its history is of help in appreciating how it fits into the world picture of supersonic flight. Originally, in 1949, the Fairey Aviation Company was investigating a transonic research aeroplane. By 1950 this had been resolved into a tailless delta layout, and estimates suggested that the speed could be extended well into the supersonic range. It was in this form that Fairey received a Ministry of Supply contract for two aeroplanes.

By 1950, it will be recalled, only one British and one American "pure" (i.e. tailless) delta aeroplane had flown (the first Avro 707 and the Convair XF-92A), although the Americans had been piling up supersonic piloting experience with the Bell X-1 and the Douglas Skyrocket for several years. Design work on the F.D.2 was finished by 1952, by which time practical experience with tailless deltas had grown. Fairey's own F.D.1 had flown, albeit with a "safety" tailplane; two variants of the Avro 707 had been flying, so had the Boulton Paul P.111 and the Douglas Skyray. One Avro 707 and the XF-92 had crashed due to difficulties of handling at low speeds. Fairey had also gained some experience of delta behaviour with its rocket-driven V.T.O. models.

To complete the history, Mr. Peter Twiss flew the first F.D.2 on 6th October 1954, and the second on 15th February 1956—both dates could have been much earlier but for the fact that the Gannet was in the super-priority programme. Following a careful test schedule, performance was slowly raised until the first supersonic flight (on the climb) last October. It would have been earlier but for the damage caused in a "dead-stick" landing. This last was an exceptionally brave and skilful piece of piloting by Peter Twiss, who, when his engine stopped due to fuel starvation, chose to stay with the aeroplane, knowing he had barely enough height to glide back to Boscombe Down. Actually, he just made it by gliding "clean", but so fine was the margin that the nosewheel only was locked and the mainwheels still right up when he touched down.

The second F.D.2 was flown supersonically on its first flight, and at the time the record was made the two aeroplanes had done some 6 hours above Mach 1 during 50 flights—out of a total of about 50

The supersonic fuselage—whatever the wing shape may be—is essentially a cylinder with a pointed nose.



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* *"The F-104" by "Boffin", pp. 232-3.*

hours and 110 flights. From these figures, the very first flight of 25 minutes and the record flight of 23 minutes one can see that the F.D.2 must carry fuel for 30-40 minutes—depending, of course, upon the speed and altitude of the flight plan.

Aerodynamic Design

Every aeroplane is a compromise and represents the designer's judgment upon the best way for meeting the specification requirements. As a research aeroplane, the F.D.2 was intended to have a certain performance envelope (speed × height) to carry the size of engine and the fuel to achieve this, *plus* pilot and recording instruments. Where it differed from the American research rocket planes was that the F.D.2 was required to carry the fuel to reach its operating altitude, make whatever period of supersonic flying was desired, and return to base. From the record results, one would guess that 10-20 minutes of high supersonic speed are possible and that acceleration, using afterburning, through and above Mach 1, is rapid—compared with the 3 or 4 minutes powered flight of the X-1.

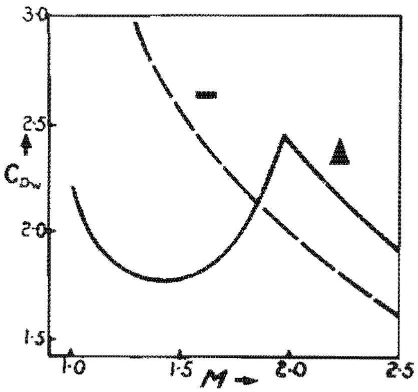


Fig. 2. Comparison of wave drag of rectangular and delta wings of similar lifting capacity. (*Courtesy, The Royal Aeronautical Society.*)

Which approach will produce the best results in the end it is too early to say, but the British method is less costly to operate. Also, starting as late as 1950, there was little point in making yet another winged bullet, for turbojet power was catching up with Dr. Mach. When the Americans started their manned supersonic investigations right after the war they *had* to use rockets to get power at altitude and this, in turn, made the mother-plane take-off a necessity.

It is also important to remember the part played by Muroc in America's high-speed flying development, eight miles of natural runway in all directions and "fine weather for 364 days in the year". It is so easy to see Muroc salt lake that no homing radio is used, even on supersonic, high-altitude flights. This is an ideal situation for research flying, quite impossible in Britain, *but* it may yet prove to be a boomerang. The use of Muroc for development testing has undoubtedly encouraged the U.S.A.F. to buy fighters which have dubious operating characteristics for combat airfields.

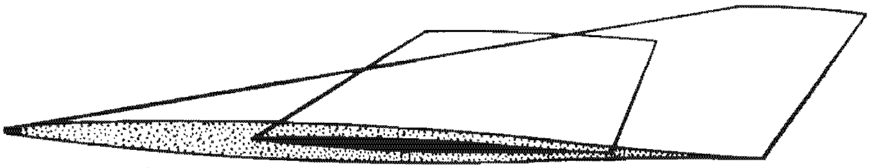


Fig. 1. Diagram of the relative volumes of delta and rectangular wings of 5% thickness chord ratio.

The great tragedy for Britain was, of course, the Government cancellation of the Miles M.52 straight-wing "1,000-m.p.h." monoplane with its Power Jets engine and afterburner. That is the real reason why today Britain has only one supersonic fighter, while the Americans have several. We have the designers, above all we have the turbojets, but we missed nearly a decade of practice.

However, to return to our subject: the supersonic aeroplane designer is faced with many of the problems of the missile designer and the need to make his aircraft controllable at low speed. It must have a wing large enough to lift the load and the fuel to go *and return*. Roughly speaking, when once the performance has been fixed—speed, ceiling, endurance—each pound of extra load will add ten pounds to the all-up weight if performance is not to suffer.

The wing generates perhaps half the drag in supersonic flight—more or less according to how the compromises are made. Fairey chose the tailless delta because it has smoother transonic characteristics than the other shapes—the drag peak is less, there is less nose-down trim change; since the area is greater and the wing loading lower the loss of C_L is less troublesome. Against this, of course, must be set the facts that the moment arm of the elevator is short and that the use of "up" elevator either for control or trim does reduce lift. A tail or nose plane could be used for trim and/or control (as in the Nord deltas), but this naturally increases drag in level flight, although it can improve lift and drag when manoeuvring. Also, for landing it allows trim without loss of lift.

As a counter to the control/trim problem, the trailing edge has been divided into ailerons and elevators of very large chord. In this way the sections can be used more effectively than if they had been one-piece elevons of smaller chord. One imagines, on the other hand, that large-chord elevons might have been over-sensitive at high indicated air speeds. It is obvious, too, that by splitting the surfaces the designer has also segregated his control problems about their respective axes.

Having split the control surfaces, the large-chord movable trailing-edge areas give both control and trim by modifying the aerofoil section rather than by "rudder" action, so that there is less drag. This is particularly the case in supersonic flight where such controls set up less violent shock-wave patterns. One would also imagine that the loss of lift with "up" elevator mentioned earlier might be greatly reduced, or even eliminated.

As one would expect, the aerofoil is thin and symmetrical The thickness scales at about 4.5 per cent, which is a maximum physical depth of over ten inches at the root. The great argument for the delta is, of course, the potential fuel volume in the wing, Fig. 1. A recently published Fairey patent shows a structure with multiple spars at right-angles to the fuselage, so that the whole wing (save the control surfaces and mainwheel bays) can form a usable fuel tank, Fig. 3. Rivet lines on the F.D.2 wing certainly suggest spanwise multi-spars, as opposed to the more usual triangulated delta structure, and there could even be considerably more fuel in the wing than there is in the fuselage.

The leading edge is not, however, a knife-edge because the delta configuration can gain from the wave suction set up by the radiused leading edge. So long as the wing leading edge remains behind the conical fuselage-nose shock-wave and the angle of its own bow shock-wave, this phenomenon will reduce wave drag, see Fig. 2. At low speed this rounded form must improve the stalling characteristics, since it ought to give a measure of stability to the stagnation point—the behaviour of the F.D.2 at Farnborough certainly suggests that this is the case. Sharp-edged aerofoils experience airflow separation at the leading edge at high incidence or low speed, and this causes an unpleasantly abrupt stall.

The positioning of the airflow fences suggests that their function is to isolate the flow over the wing-root intake and past the fuselage. It is probable that the wing roots stall first, due to the airflow separating from the sharp intake lips and, with the acute sweep angle, this would spread rapidly toward the tips were it not for the fences. The large area of the delta, plus the good low-speed behaviour of the chosen aerofoil, also eliminate the need for flaps, thus saving weight and complication.

The F.D.2 has a large fin, but not unduly so for a delta, where it is required to assist in roll-damping as well as directional stability. At high supersonic speeds—particularly at high altitude—a large fin is essential to maintain directional stability and controllability. The X-1 suffered severely from too small a fin, particularly when power was cut—a lesson clearly applied to the F-104.

Second only in importance to wing drag is the air intake in a supersonic aircraft. The thrust outlet must be at the rear in any case

(*Continued overleaf*)

The Case for the Triangle *(Continued)*

for propulsive efficiency, and so the designer's problem is to get the air into the engine with the minimum of loss. The F.D.2 scoops the air in by two sharp-lipped, D-shaped ducts which deliver it through a Y-shaped trunk into the annular engine intake. In all forms of flight it is only too easy to lose a lot of power in the intake system, but in supersonic flight this can be disastrous. Contrariwise, a good intake duct can so raise the air pressure that at, say, Mach 1.7 it is doing much of the work of the compressor. This pre-compression is due to ram effect, the slowing down of the air to subsonic velocity by the formation of shock-waves from the intake lips across the mouth.

The F.D.2's sharp lipped intakes give the best airflow in supersonic flight, while the overhang of the upper edge ensures that it will not spill at high incidence—so preventing uneven airflow, compressor stall, vibration and blade shedding. Nevertheless, sharp-lipped intakes are prone to separation and boundary layer turbulence at low speed or on static runs, causing thereby loss of power. This trouble can be largely overcome by the use of spring-loaded vents, which act rather like wingtip slots. The usual boundary-layer bleeds are fitted along the fuselage sides of the F.D.2.

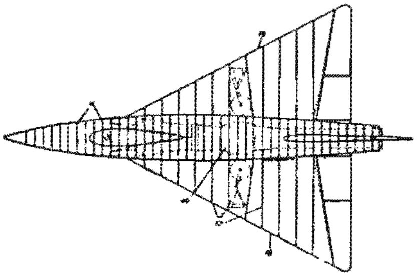


Fig. 3. The structure of the Fairey deltas is from early Patent specification 734,532.

Fairey has said that the F.D.2 was designed with a full knowledge of "area rule", but with this particular type of intake it is very difficult to assess precisely the variation of cross-sectional area or "waisting" at the wing juncture.

Security regulations prevent the disclosure of which type of Rolls-Royce Avon is fitted, or its thrust. It is stated to be a standard engine and it has an afterburner—the latter being essential for any real excursion into level supersonic speeds. The RA-28 has been type-tested at 10,000 lb. static thrust, while modern afterburners give some 40 per cent thrust increase. Perhaps a reasonable guess would be that the Avon in the F.D.2 gives a power at Mach 1.7 and 36,000 feet equivalent to 14,000-lb. sea-level static thrust—allowing for a reduction in turbojet and an increase of afterburning power.

The fuselage is, as one expects in a supersonic aeroplane, very slender, with a fineness ratio of 11 : 1 and an entry cone angle of about ten degrees. The forward end is elliptical, changing to cylindrical at the engine, and the cockpit is the minimum practical excrescence. Cockpit drag at high supersonic speeds can be very serious indeed, that is why the F.D.2, P.1 and F-104 rely rather upon recessed windscreens than upon bulged canopies for what view there is. The dimensions fit the pilot very closely and the glazing is reduced to a minimum as a safeguard against canopy failure due to air loads or aerodynamic heating—during the few minutes of each record run there was a rise of about 100° C. due to skin friction. The "droop-snoot" cockpit device allows the nose to be lowered ten degrees for landing to compensate for the loss of view due to high incidence. It is possible that this action also improves the airflow over the wing root and tail, since there is a tendency for a high-pointing nose to cause a breakaway and premature stall—hence the slots often fitted alongside wingtip tanks.

The flying controls, rudder, ailerons and elevators, are hydraulically operated by Fairey Hydroboosters incorporating a "feel" system. The fairings under the wing cover the aileron boosters, which cannot be housed entirely inside the thin wing surface. There is (presumably) a hydraulic accumulator reserve, topped up in emergency from a pump driven by a Rotol ram-air turbine. The flying controls have first call on the reserve and emergency system, as was demonstrated by Peter Twiss's forced landing. The air brakes are four "doors" mounted round the jetpipe fairing.

The undercarriage for a delta aeroplane is always rather long because it has to give clearance for the tail at high incidence and also has to provide a positive static incidence. The latter reason is due to the fact that when the elevators are raised to lift the nose they cause a momentary reduction of wing area—and lift. In some of the early deltas it was found that a level ground attitude resulted in very unstable take-off conditions. Even so, one would imagine that in the case of the F.D.2 the designer would have preferred an even longer undercarriage if he had had more stowage space, since the present one scarcely allows full advantage of the available incidence to be taken.

The twin-wheel front leg retracts backward into the fuselage, while the lever-action main legs (which have tension shock-absorbers) retract forward, turning to lie flat inside doors with a slight blister. Special narrow, high-pressure tyres were evolved by Dunlop to fit into the thin wing. Maxaret anti-skid brakes are fitted to aid stopping, and the F.D.2 also has triple 4-ft. 6-in. diameter brake 'chutes—really an essential at today's landing speeds.

Two odd features in the F.D.2 *vis-à-vis* the F-104 are (i) that it has two external whip aerials, which apparently survive the terrific blast of air at Mach 1.75 and do not occasion undue drag, and (ii) that it has several external cooling scoops, as opposed to NACA flush-entry ones. Suppressed aerials, as exclusively used on the F-104, do, of course, suffer shielding during manoeuvres.

Conclusion

Inevitably, invidious comparisons are drawn between the F.D.2, the X-1, the F-104, and so on. It largely depends upon the nationality of the writer or reader, which view is taken upon their relative merits. What really matters is that each one adds to the West's knowledge of supersonic flight and to potential supremacy over the East. The ultimate aim is still to produce the fastest *and most usable weapon.* Speed alone is not the answer; the fighter must have a practical endurance, the controllability to manoeuvre accurately at great heights and the ability to discharge its weapons with a sure aim.

Which brings us to that vexed question: when will the missile supersede the man? The piloted aircraft is bulky, it has to be able to take off and land controllably (instead of being boosted to Mach 2 in a couple of seconds), and much of its guidance system is applicable to manned aircraft, but for all that none of its complicated electronic gadgetry can *think.* It is true that computors can calculate precise interception courses at lightning speed, but they cannot reason and decide like the human brain. Furthermore, the missile is expendable and therefore very expensive when produced in worthwhile numbers. Peter Twiss's precise flying at almost twelve miles a minute is an indication of how infinitely adaptable the human brain can be. The range, endurance and manoeuvrability plus "pilotability" of the F.D.2 suggest that the formula is a practical one for a supersonic fighter. It should, one would think, be possible to add military load, with more power, of course, and still make a fighter less than twice the present size. Moreover, such an aeroplane should have a practical endurance and the undoubted power to manoeuvre at great heights.

PRINCIPAL CHARACTERISTICS

Engine	Rolls-Royce Avon, with afterburner
Type	RA 14 series, with cannular combustion chamber

Dimensions:

Span	26 ft. 10 in.
Length	51 ft. 7.5 in.
Height	11 ft. 0 in.
Track	7 ft. 7.6 in.

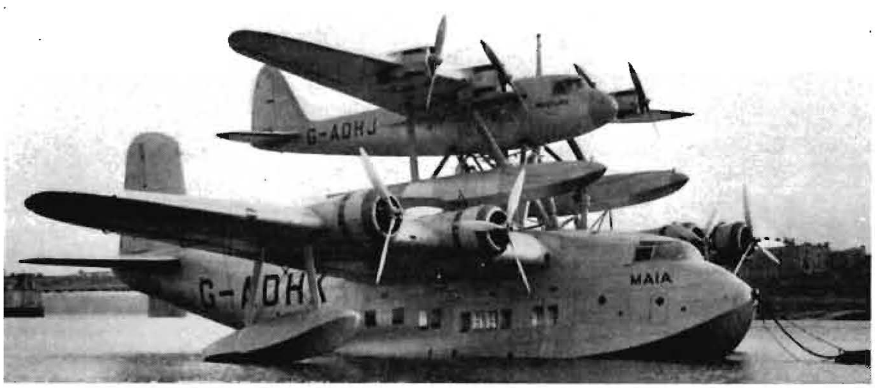
Angles:

Wing incidence, to fuselage datum	1.5°
Static ground angle	5°
Nose droop for landing	10°
Sweepback, wing leading edge	60°
Sweepback, fin leading edge	60°

Areas:*

Wing, gross	360 sq. ft.
Ailerons, both	32 sq. ft.
Elevators, both	40 sq. ft.
Fin, gross	40 sq. ft.
Rudder	10 sq. ft.
Thickness/chord ratio	4.5%

* *Measured from Fairey drawing.*



"Maia-Mercury" (Mayo-Composite) 1938. This daring and revolutionary idea combined two aircraft, one being carried "pick-a-back" until released. The component Mercury still holds the world's long-distance seaplane record. The bottom component was a strengthened "Empire" Class flying-boat.

Test Flying 1915-39

By J. Lankester Parker, O.B.E., F.R.Ae.S.

THE technique of test flying has changed a great deal since I was appointed Test Pilot to Short Bros. way back in 1916. I think it is true to say that the purpose of test flying and the general principles involved in the work have remained fundamentally the same.

A new type of aeroplane is conceived to meet the need of some future civil or military requirement. Into this new project will be put all the technical and much of the financial resources of the company concerned, in addition to all the knowledge and experience that are available. Inevitably there will be some guesswork too; for example, nobody knows exactly what the power, the weight and the consumption of the engine units will be by the time they are needed.

It is not until the test pilot has proved the new product to be capable of doing what its creators intended that success can be claimed. More than likely, his first flights will only prove that it falls far short of the hoped-for goal. In that event much will depend on the qualities of the pilot, and that of the chief designer and the other technicians. If they have confidence in each other all will be well.

As may be supposed, the art of the test pilot has developed with equal or greater speed to keep pace with the growing size, weight and performance of aircraft. Today, one little mistake and a million pounds can be written off in a few seconds. But if the aeroplane has changed, so has the technique of flying. The development of new instruments for blind flying and navigation, longer range, vastly superior reliability and radio and radar communication have made it practical to fly in conditions, particularly of bad visibility, which before would have been impossible.

The first prototype I tested was in 1915 on Lake Windermere. It was the Northern Aircraft Company biplane, a pusher with twin floats and a 60-h.p. Green engine. The engine was like the normal motor car one. It had four cylinders and was water cooled. It gave about big-car power and was as heavy. The aeroplane was designed and built by a group of amateurs led by one technician. The stressing was quite elementary, but fortunately it held together. After some teething troubles, which included an explosion in one of the floats, resulting from the vast quantities of petrol which had been injected into the engine, it flew quite well. It was used for *ab initio* training for some years. Its performance was never measured, but its top speed was around 45 m.p.h. and its absolute ceiling height about 2,000 feet.

A year later I was entrusted with a "Short" prototype, my first of a long line. Known as the Scout, it was a tractor seaplane with twin floats and a 200-h.p. Sunbeam engine, the power of which almost over awed me. This model only slightly differed from the standard "225" Short Seaplane then being used by the Royal Naval Air Service. It was a more compact machine with wings of even span. The floats were fitted with extensions behind the main step in an attempt to eliminate the customary tail float, and its alleged weakness if one was forced down in a rough sea. Though troublesome at first, it eventually performed well but was not considered to be of sufficient advance over the production "225" to displace that well-loved seaplane.

As a classic illustration of the incredibly rapid development to which I have referred I think an account of the trials of the Short "Shirl" would be hard to beat. The Shirl was a single-seat torpedo-carrying aeroplane designed to operate from either carriers or land bases. It was more or less a normal tractor biplane of the period fitted with a single Rolls-Royce engine of 375 h.p. Two prototypes were made and were ready for flight about the middle of 1918. The idea was that the first one would go to the Royal Air Force Test-station at Martlesham Heath for normal flying trials, and the second one, a few weeks later, to the Naval Air Station at East Fortune in Scotland for torpedo-launching trials. The accent was on urgency, for the submarine menace was at its height. After a couple of short flights and some adjustments I set off for Martlesham from the Isle of Grain.

We had to use the Naval Station there, for Shorts, having vacated Eastchurch, had no aerodrome of their own at that time. It proved to be an eventful flight. Five miles from the Isle of Grain the engine stopped completely, due to a sheared petrol pump, and I was forced to land in a small field, complete with a dummy 1,400-lb. torpedo. The ground staff had seen my descent and soon came to my rescue. An hour or so later I was once more on my way. Whether or not I had strained the throttle mechanism in my anxiety to clear the ditch at the end of the small field I do not know. What I do know was that I could not throttle the engine at all, it would only run at full take-off power. This was particularly embarrassing, for the propeller was too small and I could only prevent serious over-speeding of the engine by keeping on a full climb. The result was that I arrived over Martlesham at 12,000 feet. Thereupon I switched off the engine, stopped the propeller and landed quietly in the middle of the aerodrome. It was, to say the least an undignified arrival with a new type.

The second prototype Shirl differed from the first in several ways, the most noticeable difference being a pronounced sweep-back to the mainplanes, a feature I had long advocated. Not only in the interest of tail heaviness but because all the best flying birds had it, not to mention arrows and darts and such like. And it looked nice.

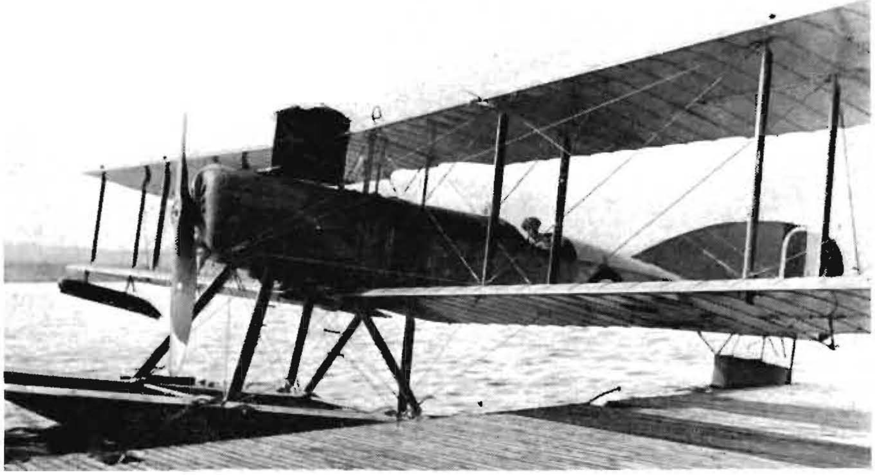
The first flight with the second Shirl took place from the Isle of Grain before noon on a day that will live long in my memory. The fore-and-aft trim was quite hopeless and about half the elevator control was needed to correct the tail heaviness (there was no adjustable trim device in those days). A hurried conference took place and it was decided to remove the complete tailplane, make new fitting attachments, and refit it with an increased angle of attack of some 5 degrees. By four o'clock the same day I set off on the second flight. Because the Navy were pressing us so hard for delivery I decided to equip myself with the appropriate maps for the trip to East Fortune, just in case the guessed tail adjustment had done the trick. It had, and I flew the 400 miles there in approximately four and a half hours. Four hundred miles does not sound much nowadays but it was a long way then. When I add that the only instruments fitted were a radiator thermometer, an engine rev. counter, an air-speed indicator (which did not work) a small compass which had not been swung, a cross-level and a fore-and-aft level, that it was a thundery, cloudy day, that I flew most of the way at 13,000 feet and through cloud at times, and that there were no officials to put difficulties in my way, you will see that conditions in 1918 were indeed different from those of today.

(Continued overleaf)

Test Flying *(Continued)*

The eighteen years which separated the Shirl tests from those of the Empire flying-boat saw an imposing list of Short aircraft. They ranged from the miniature "Gull" monoplane powered with a standard motor-cycle engine of 700 c.c. and a small twin-engined flying-boat, probably the first metal one in the world, fitted with two similar 12-h.p. engines, to the 40-seat Scylla land aeroplane with four 500-h.p. Bristol engines and the Sarafand flying-boat weighing 70,000 lbs. and powered with six Rolls-Royce engines of 1,000 h.p. each. In between these two extremes came all sorts of shapes and sizes, some for civil use, some fighters and bombers and some just experimental. In the latter category was the "Mussel", a little 100-h.p. two-seat monoplane fitted with a single landing wheel and with skids at wing-tips and tail. It was also equipped with the relatively modern type of balanced controls, in particular with Frise-type balanced ailerons which gave a new meaning to pilots' confidence and rapidity of manoeuvre.

Another aircraft of particular interest in this era was the "Knuckleduster" monoplane flying-boat with angled wings resembling a gull and made of stainless steel. A further innovation was that the two Rolls-Royce "Goshawk" engines were cooled by steam. The company must have gained a great deal of knowledge from this machine, certainly the test pilot did. The steel spars though strong were also flexible, so much so that when the aileron control was operated in flight the effect was to twist the wing rather than move the aileron, with consequent loss of control. We also ran into another disease: violent wing flutter in bumpy air conditions. The curing of these snags, and cured they soon were, taught us all quite a lot. It finished up as a pleasant aeroplane. Another popular little aeroplane was the Short Scion, a civil seven-seater with two 90-h.p. Pobjoy engines. This developed into the "Scion Senior", a ten-seater with four Pobjoys.



225 Seaplane 1915. Powered by a 225-h.p. Sunbeam engine, this well-known Short seaplane was in service, with the Royal Navy, throughout the war of 1914-18.

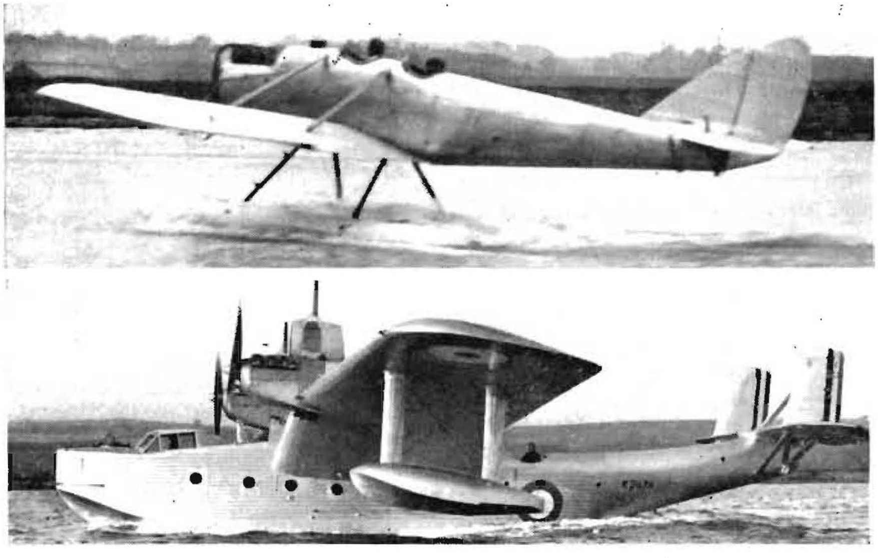
Soon the ultimately famous "Empire" flying-boat was conceived together with its military counterpart, the "Sunderland", which is still in service. Because the Bristol engines with which these boats were fitted were exactly double the diameter of the Scion's Pobjoys it was decided to make the whole aircraft double scale too. That one was a land-going aeroplane and the other a flying-boat had no real bearing on the problem.

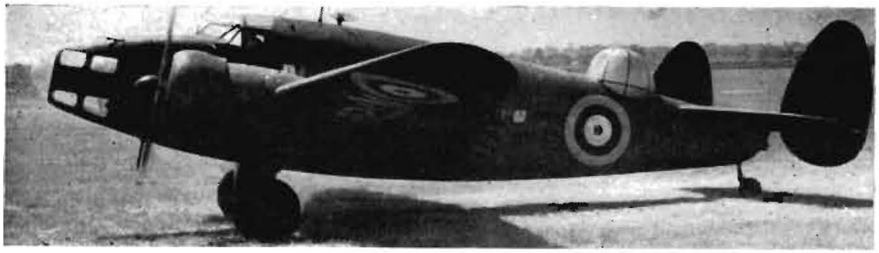
Since I did the test flying on both the Empire boat and the Sunderland it is interesting to recall the few specified tests laid down for the guidance of the test pilot in those days. Of course he was required to fly an aircraft at full load and make take-offs and landings and dive to a certain speed with the centre of gravity outside the limits laid down for the airworthiness certificate. Of course he had to discover the real performance, the best climbing speed at all heights, the best position for flaps and ensure that the engine and oil temperatures were within required limits. But it was left to him to judge many other major issues. Since both the Empire boat and the Sunderland have had a distinguished record I suppose I can claim that the methods which I employed have been successful. I have no space to give a detailed account of these methods, but I would like to give just a few examples. As a check on lateral stability I had the aircraft loaded with the C.G. off centre by one foot (1 per cent of the span). That it cruised within one degree of level laterally with hands off the controls satisfied me. That I could land at stalling angle with wings level gave a clue to aileron power. That I could fly at slow speed with two dead engines on one side indicated rudder power. That I could fly straight with full rudder indicated fin power. And so on.

In my time there followed other interesting aircraft, such as the Mayo-Composite, the Golden-Hind flying-boat, the Stirling heavy bomber, and the Shetland, all of which brought their own problems, too many and varied to enter into here.

Finally I would say that the modern test pilot, though he has a much greater background of experience to call on and is equipped with many aids in the form of recording instruments and even with a parachute to play as a last card, and, though he has the guidance of much better-informed technical advice and a much more exactly defined duty to perform, is playing with the unknown at least as much as we older ones were. Aviation has always been like that. No sooner do we learn how to fly safely at one speed or at one height than progress demands that we fly faster and higher. I know I shall be accused of prejudice when I say that I do not believe it was possible to produce a world-beating aeroplane in the past without the services of a first-class test pilot with a considerable freedom of action. I do not believe that condition has changed one bit today, but I detect a slight tendency in some quarters to regard the test pilot as a necessary evil pending the time when the perfect automatic pilot will be with us. I can only add that I sincerely hope, in the interests of progress, that my suspicions are entirely unfounded.

Top Mussel 1926. A light sporting seaplane. It could also be fitted with wheels. *Bottom* Knuckleduster 1934. This flying-boat had gull-shaped wings and two steam-cooled engines.





The first Hudson, N7205, seen in the form in which it arrived in this country, with a wooden mock-up turret.

U.S. Aircraft in the British Services 1914-55

By "Chronicler" and Bruce Robertson

(PART II)

THE first British air mission in America, in April 1938, included among its members Air Cmdre. A. T. Harris (later to become C.-in-C. of Bomber Command) and Sir Henry Self, who remained in America to give vital service in the later purchasing commissions.

The mission visited the entire American industry and found it in a worse state of depression than Britain's had been before the rearmament programme. The industry was only too ready to receive the British mission, and a measure of this readiness is provided by the story of its visit to the Lockheed company.

One of the types of aircraft the mission wanted to purchase was a reconnaissance bomber for Coastal Command. Lockheed had nothing suitable to offer, but asked for forty-eight hours in which to produce a design based on their existing Model 14 commercial transport. Two days later, the commission were amazed to find a full-size mock-up of the proposed bomber; it was accepted and an order placed for 200—the first of the Hudsons.

The only other major contract placed by this mission was with North American, for 200 of their N.A.16 advanced trainers. This type was named Harvard in R.A.F. service and the order was later doubled.

About the same time, a French mission was in America with the same purpose, ordering, early in 1938, 100 Curtiss P-36 Hawk fighters. After the Munich crisis, with the threat of war becoming more real every day, British orders were reduced to a trickle, since it was known that under the American Neutrality Act, if war started no arms could be delivered. France was less apprehensive, and a new French Air Mission in January 1939 began its work with an order for 115 Martin Maryland bombers. Other types ordered included more Hawks, Harvards, Curtiss P-40s and Douglas DB-7s, in addition to large quantities of engines for French aircraft.

On 3rd September 1939, when Britain and France declared War on Germany, the U.S. President had no choice but to enforce the arms embargo. It was not, however, in keeping with the sympathies of American Senate and Congress which, on 4th November 1939, passed an Act permitting Britain and France to purchase arms for cash and carry them away in their own ships—the so-called "cash and carry" Act.

Three days later, a new British Purchasing Commission was established in America, under Arthur B. Purvis. A similar French mission was established under Jean F. Bloch-Laine. These were quickly followed by the establishment of an Anglo-French Co-ordinating Commission under Jean Monet in London and an Anglo-French Purchasing Board in America under Purvis.

The policy now changed. Instead of selecting a few types for acquisition, the Purchasing Board set out to saturate the American industry with orders, with the intention not only of obtaining aircraft and other equipment, but also of gearing American industry up to large-scale production. Money was spent, not only on the equipment required, but in establishing manufacturing facilities: entire factories were built in some places with British money.

The significance of the British and French orders at this time is probably not generally appreciated in this context. For instance, in the first half of 1940, the Purchasing Board ordered more than 8,000 aircraft and 13,000 engines; this brought the total since January 1939 to 10,800 aircraft. Thus, after Pearl Harbour, the expansion of American requirements was possible largely because of the foundations laid by the foreign contracts. The American industry began its expansion some three years earlier than would have been possible on American orders alone. The value of the orders to Britain was less immediately tangible; only 104 aircraft were shipped in the first half of 1940, with 557 sent to France in the same period.

To help make equipment more readily available, the U.S. Government evolved a scheme early in 1940 whereby the armed forces would "trade-in" existing arms for more up-to-date equipment, and the older material would be sold to Britain and France —"off the shelf". This arrangement was mostly of value in respect of rifles, machine guns, howitzers and ammunition desperately needed by the British Army after Dunkirk. The Purchasing Board did acquire in this way, however, fifty Curtiss SBC-4 biplanes from the U.S. Navy and ninety-three Northrop A-17A monoplanes from the U.S.A.A.F. A large proportion of the SBC-4s and thirty-two of the Northrops were put aboard the Béarn in transit to France and spent the rest of the war rusting, with the ship, at Martinique, where she was diverted during her voyage. The remainder, as Clevelands and Nomads, came to Britain.

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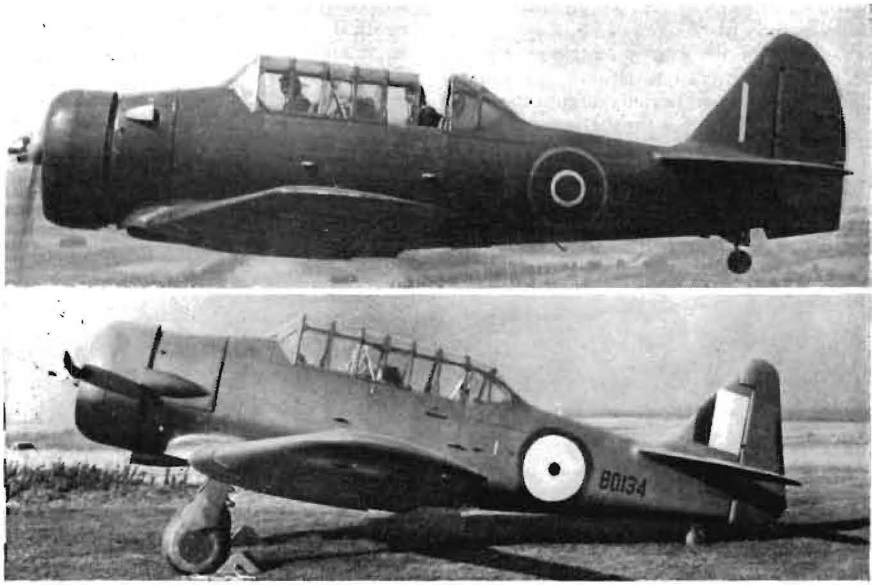
Different engine cowling, rudder shape and wingtips distinguish the Harvard I (N7015) (*top*), from the Harvard II (BD134) (*bottom*). The latter example was absorbed from an original French contract.



U.S. Aircraft in British Service

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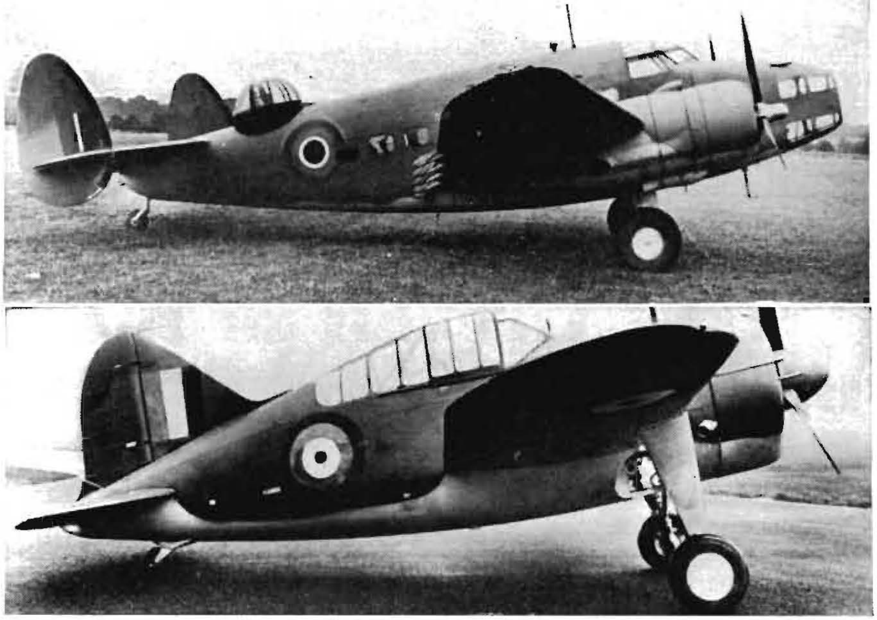


Top: The rarest version of the Hudson was the Mk. IV, only thirty of which reached the R.A.F., including AE628 illustrated. It was intended principally for Australian service. *Bottom:* This Buffalo, AS426, was one of the small number of these machines taken over from Belgian contracts; in addition, one hundred and seventy Buffaloes were purchased on British contracts.

The fall of France brought a crisis in the Purchasing Board. It was recognised that if France capitulated, all her supply assets in America would be inactivated, and that contracts placed by the Board on behalf of France might become the subject of an involved legal tangle which would not only deprive Britain of French-ordered equipment she could now use, but also have repercussions on British orders. In great haste, and acting virtually on his own authority, Purvis negotiated with his French colleagues on the Board arrangements whereby Britain took over all existing French contracts. The signature of the document—five hours before the U.S. Treasury Department froze all French assets in the United States—obligated Britain to a further $600 million of supplies, not all of which were wanted. It was, however, a bold and necessary step—and explains the inclusion in this record, of a number of aircraft which are listed as "ex-French contract".

The fall of France had the effect of stepping up, once again, the rate at which British contracts were placed in America. By December 1940, Britain had ordered 11,000 aircraft (including the French orders taken over) and had received permission from the American Priorities Board to place contracts for another 12,000. The point was now reached, however, when Britain could no longer afford to purchase equipment at this rate for cash. In December 1940, Britain had about $2,000 million left to spend, of which three-quarters was already earmarked to pay for war goods ordered but not delivered.

It was at this point that plans began to be made for some other form of aid to Britain—and also to China and the other nations still fighting the Axis powers. These plans came to fruition on 11th March 1941 with the signing of the Lend-Lease Act. For some time after this date, however, deliveries of aircraft to Britain continued to be, in the large majority, against the cash contracts already placed.

Delivery of the ever-mounting numbers of American aircraft to Britain was something of a problem. Initially, and in the case of some aircraft types throughout, delivery could only be made by sea. Toward the end of 1940, deliveries by air across the Atlantic began, the route being pioneered by a Consolidated Catalina and used initially by Hudsons.

To handle the American aircraft in Britain, various arrangements were made. Lockheed, for example, established a unit at Speke Airport, Liverpool, to assemble Hudsons, and from 1939 onwards, many types of aircraft were handled there. Inevitably, American types flying with the British forces required modifications for which design action was often necessary. The practice grew up of appointing British aircraft companies as "sister firms" to American companies, with responsibility for specific types of aircraft. Thus, Blackburn looked after all Grumman types, Westland handled the Mohawk and Tomahawk, Saunders-Roe the Catalina, and so on.

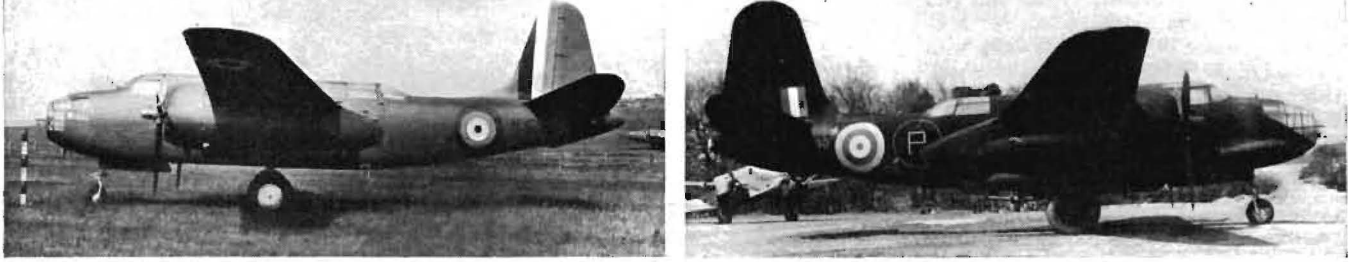
The various types of aircraft purchased by the different commissions outlined above, between 1938 and 1941, will now be considered, in the approximate chronological order in which they were ordered. The record is rounded off with a table of important data for the contracts covered by this instalment.

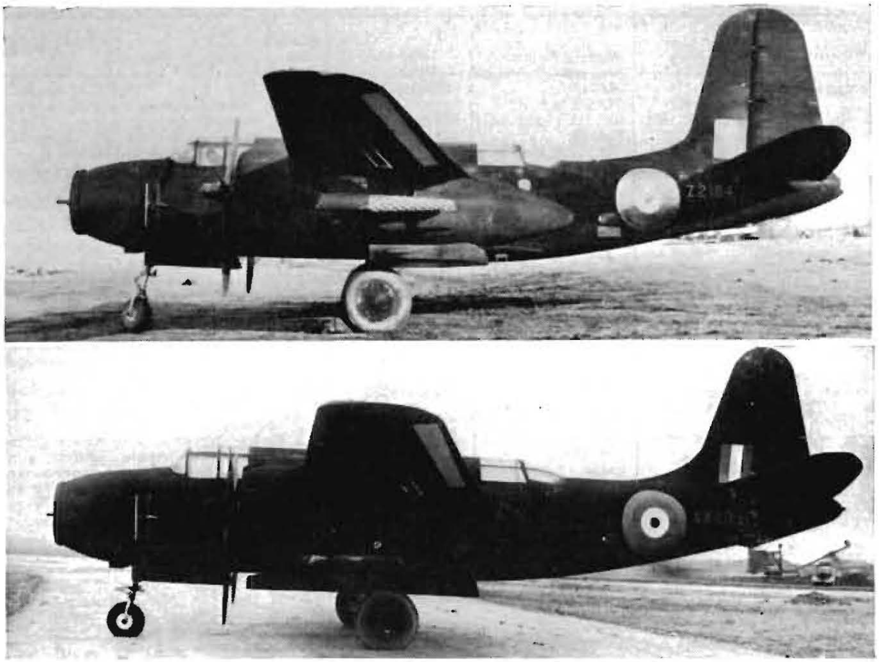
North American Harvard. The first contract placed by the British air mission of 1938 was with North American Aviation for 200 of their N.A.16-1 advanced trainers (U.S.-A.A.F. BC-1). Named, by the R.A.F., the Harvard I, it was the forerunner of later versions of the Harvard which remain in service in Britain to the present day.

The first aircraft of the batch, N7000, arrived at the A. and A.E.E., Martlesham Heath, towards the end of 1938, and was subjected to extensive handling trials, completing eighty-nine hours before being written off in a crash in February 1939. Two Harvards were issued to No. 12 F.T.S. in January 1939, being the first of the type to go into service.

Orders for additional quantities of Harvards were an early priority of the British Purchasing Commission of 1939, and con-

Left: The Boston I, few examples of which reached Britain, was a version originally ordered by France and Belgium; distinctive features were the nose design, engines, nacelle length and fin and rudder shape. *Right:* Little-known experimental version of the Boston, often confused with the Havoc because of its all-black finish, was the Boston III (Intruder). W8290 was one of several converted to carry a ventral gun pack, just discernible in this photograph behind the nosewheel door.





Little publicity has ever been given to the experiments with Turbinlite airborne searchlights in this country, but nearly one hundred Havocs were fitted with them. These pictures show a Boston III, Z2184 (*top*), and a Havoc I, AW400 (*bottom*).

tracts were placed on behalf of the R.A.F., R.C.A.F. and R.N.Z.A.F. The subject of these new orders was the Harvard II (U.S.A.A.F. AT-6). Important differences between the Mk. I and II were the latter's square wingtips and angular fin and rudder.

The total of British contracts for the Harvard II was swelled by about fifty absorbed from French contracts in 1940. The type was widely used for training throughout the war, in Canada, the United Kingdom, Southern Rhodesia and elsewhere. Later versions were supplied under Lend-Lease.

Lockheed Hudson. The initial order for the type was for 200, but nearly 1,500 had been ordered before Lend-Lease began and more than 1,000 were supplied after.

Having made its first flight on 10th December 1938, the first Hudson I, N7205, was at the A. and A.E.E. by March 1939 and later became a "hack" for radio and other trials at the R.A.E.; it was actually preceded to this country by N7206 which arrived in February, later going to Boulton Paul for turret fitting. The bulbous dorsal turret was of B.P. design and was fitted after the aircraft arrived in this country.

In May 1939, Hudson I, N7212, went into service with Anson-equipped No. 224 Squadron—the first Hudson to become operational. Thereafter, the type quickly established its usefulness, and from the first day of the war was used for patrol and bombing operations with Coastal Command. As early as January 1940, Hudsons were fitted with ASV (air-to-surface vessel) radar, with its distinctive aerial array under the wings and nose and along the fuselage top.

As the war progressed, Hudsons of various marks were acquired, all on British contracts (see table), and were adopted for a variety of roles. These included agent-ferrying involving, in some cases, landings behind the enemy lines; transport and ferry duties and air-sea rescue duties, with a British Mk. I lifeboat under the fuselage—the Hudson was, in fact, the first type of aircraft to carry this lifeboat.

Apart from its use by the R.A.F., the Hudson also saw service in other parts of the Commonwealth. Several examples were retained in Canada to train ferry crews for the Atlantic hop; others went to South Africa and New Zealand, and several batches were allocated to the R.A.A.F. Of the first 100 R.A.A.F. Hudsons (A16-1 to A16-100), a large proportion was lost during the Malayan campaign. The Mks. IIIA and VI were exclusively Lend-Lease types.

Brewster Buffalo. Designed and in production for the U.S. Navy as the F2A-2 (Brewster Model 339), 170 Buffalo were ordered by the 1940 British Purchasing Commission. Few of the machines reached this country, for after R.A.F. trials with W8131, W8132 and W8133 in 1940, the type was allocated to the Far East where the majority went direct from the U.S.A. Most of the 170 had been delivered by mid-1941, and the Buffalo saw service with four R.A.F. squadrons in the Far East.

In addition to these contracts, two batches of Buffaloes ordered by the Belgian Air Force were absorbed by the British mission in 1940. Most of these went to the U.K. (e.g. AS426 at the A. and A.E.E. in November 1940) and were allocated to the Royal Navy; they did not see operational service.

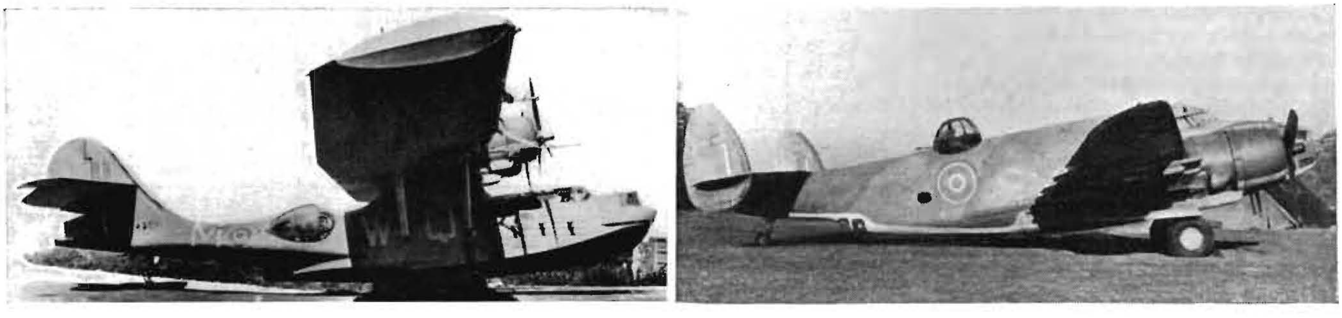
Douglas Boston. One of the best known American aircraft procured by the R.A.F. during the war, its later versions were widely used by the U.S.A.A.F. in Europe in addition to the R.A.F. Known as the DB (Douglas Bomber) -7, the first flight was made on 17th August 1939, and initial orders were placed with the Douglas company by the French air mission, with the British 1940 mission second in the queue.

The unfulfilled portion of the French contract (and possibly some Belgian orders) was later absorbed by Britain, so that the Boston III was the first of the type supplied against the original British contract. It was preceded by a small number of Boston Is which were for the most part used for training, and a large number of Boston IIs, almost all of which were converted to Havoc I standard.

The Boston III had more powerful Wright R-2600 engines, in place of the Pratt & Whitney R-1830s, a larger fin and rudder, redesigned front fuselage and longer nacelles. Deliveries began (with W8252) in the spring of 1941, and the type was in action for the first time early in 1942.

(*Continued overleaf*)

Left: This Catalina IIA, VA703, was one of a batch ordered for use by the R.C.A.F. but diverted to Britain and renumbered in the VA serial group long before that range had been reached in proper allocating sequence. *Right*: A Ventura II photographed at Boscombe Down with an experimental installation of eight rocket projectiles beneath the wings.



U.S. Aircraft in British Service

(Continued)

Apart from the aircraft listed in the table, procured direct from the U.S.A., more Boston IIIs were acquired in the Middle East in 1942, apparently being aircraft delivered to the French Air Force in 1939–40. Those which went into service with the R.A.F. included HK869, 870, 872–899, 912, 918, 923, 924, 934, 960, 962, 964, 967, 969, 970, 972 and 973 (this serial batch was not inclusive).

Versions of the Boston officially designated Boston III (Intruder) and Boston III (Turbinlite) also existed, although it is not clear how the latter differed from the Havoc II (Turbinlite) except in its origin. The Boston III (Intruder) was similar to the Havoc I (Intruder) apart from its later features already noted. Examples of the Boston III (Intruder) in the initial batch included W8262, 8264, 8266, 8268, etc., while Boston III (Turbinlite) examples were W8265, 8275, 8276 and 8296.

Other Bostons were used for various experiments in this country, notably W8315, fitted with a Boulton Paul power-operated, two-gun dorsal turret in mid-1942, and W8268/G, armed with eight R.P.

Douglas Havoc. This machine, originally named Ranger, but later renamed, was an interesting alternative of the Boston and existed in several versions. Basically, the Havoc was a night-fighter version of the Boston bomber, and Havoc Is were all conversions of machines acquired in America as Boston IIs from original French contracts, totalling over 100. One British contract was placed for Havoc IIs (with airframe changes comparable to these of the Boston III but retaining the original front fuselage) and a few Boston IIIs were converted to Havoc IIs also. Versions designated Havoc III and Havoc IV respectively were later re-designated Havoc I (Pandora) and Havoc I (Intruder).

Initial conversions of the Boston II (at Burtonwood) produced the basic Havoc I in 1940, with eight machine guns in a "solid" nose and A.I. radar of the "arrowhead" type. The finish was matt black overall and flame-damping exhausts were fitted. This was a night fighter, whereas the Havoc I (Intruder) was a fighter-bomber for night operations over enemy country, and retained the transparent bomb-aimers' nose.

The Havoc I (Pandora) was the subject of an interesting and little known experiment with No. 93 Squadron, carrying in the bomb-bay a device known as the L.A.M. (long aerial mine). This was a device which was intended to be trailed 2,000 ft. behind the Havoc in the path of hostile bombers; it was not, however, operationally successful.

The Havoc IIs, after arrival in this country, were converted to night-fighter standard, similar to the initial Havoc Is, but with twelve machine guns in the nose.

As noted, both marks of Havoc were converted to carry the Helmore Turbinlite. This was an airborne searchlight of 2,700 million candlepower, carried in the nose of

(Continued opposite)

Aircraft	*Power Plant*	*Model Information*	*Serial Nos.*	*Quantity*	*Remarks*
Harvard I	1 × Wasp R-1340-S3H1	NA-16. U.S.A.A.F. BC-1	N7000–N7199	200	The first "1938" contract. Rounded wingtips and rudder.
			P5783–P5982	200	Repeat order.
Harvard II	1 × Wasp R-1340-S3H1	NA-16. U.S.A.A.F. AT-6	AH185–AH204	20	New series; square wingtips, triangular fin and rudder.
			AJ538–AJ987	450	Majority used for Commonwealth Training Scheme.
			BD130–BD137	8	Believed to be ex-French contracts.
			BJ400–BJ419	20	
			BW184–BW207	24	British contract.
			NZ901–NZ967	67	Deliveries to R.N.Z.A.F., 1941.
			2501–	—	Approx. 700 to R.C.A.F.
Hudson I	2 × Cyclone R-1820-G102A	L-214, L-314	N7205–N7404	200	Military version of Model 14 commercial transport.
			P5116–P5165	50	Addition to first contract.
			R4059	(1)	Replacement for N7260.
			T9266–T9365	100	Hudson I had two-position Hamilton Standard airscrews.
Hudson II	2 × Cyclone R-1820-G102A	L-314	T9366–T9385	20	As Hudson I, with Hamilton Standard Hydromatic c.s. airscrews.
Hudson III	2 × Cyclone R-1820-G205A	L-414. U.S.A.A.F. A-29; U.S.N. PBO-1	T9386–T9465	80	As Hudson II, with new engines and retractable ventral gun position. This batch short-range version (see below). T9465 "The Spirit of Lockheed-Vega Employees" — 1,000th Hudson built.
			V8975–V8999	25	
			V9020–V9065	46	
			V9066–V9069	4	All Hudson IIIs from V9066 onwards are long-range version with additional wing fuel tanks. Some later used to carry British Mk. I airborne lifeboat.
			V9090–V9129	40	
			V9150–V9199	50	
			V9220–V9254	35	V9235–V9252 diverted to R.N.Z.A.F. and re-numbered.
			AE485–AE608	124	AE490, AE495–504 diverted to R.N.Z.A.F. and renumbered.
			AM930–AM935	6	Final Mk. III Hudsons.
Hudson IV	2 × Twin Wasp R-1830-SC3G.	L-414.	A16.1–A16.100	100	Developed for R.A.A.F.
			AE609–AE638	30	Small batch of Australian-type Hudsons for R.A.F.
Hudson V	2 × Twin Wasp R-1830-S3C4-G	L-414	AM520-AM702	183	As Mk. III, with new engines. Two-position airscrews. AM589–AM594 to R.N.Z.A.F.
			AE639–AE657	19	All AE Hudson Vs and AM703 et seq. are long-range version.
			AM703–AM909	107	
Buffalo I	1 × Cyclone GR-1820-G105A	B-339E. U.S.N. F2A-2	W8131–W8250	120	Few initially to U.K. for evaluation; most direct to Far East.
			AN168–AN217	50	To Far East.
Buffalo I	1 × Cyclone GR-1820-G105A	B-439. U.S.N. F2A-3	AS410–AS437	28	Ex-Belgian contract. Mostly to U.K. for R.N. but never operational.
			AX811–AX820	10	
Boston I	2 × R-1830-SC3G	DB-7	*AE457-AE472*	—	AE457–AE467 reported ex-Belgian contract.
			DK274–DK277	4	Arrived in the U.K. damaged and struck off charge.
Boston II	2 × R-1830-S3C4G	DB-7B.3	—	—	All converted to Havoc I.
Boston III	2 × R-2600-A5BO	DB-7B. U.S.A.F. A-20C	W8252–W8401	150	New engines; longer rear nacelles; broad-chord fin and rudder.
			Z2155–Z2304	150	Some as Boston III (Intruder) and (Turbinlite).
			AH740	1	Replacement aircraft.
			AL263–AL502	240	Mostly used as plain bombers. Some diverted direct to Russia from AL265 onwards.
			AL668–AL907	240	As above, built by Boeing.
Havoc I	2 × R-1830-S3C4G	DB-7B.3	AW392–AW414	23	Havoc Is were all ex-French or ex-Belgian contract. Short nacelles, triangular fin and rudder. Originally designated Boston II before conversion. Basic night fighter had "solid" nose with eight machine guns. Havoc I (Pandora), originally Havoc III, carried long aerial mines (L.A.M.) for use against enemy bomber formations. Crew of two, four m/gs.
			AX848–AX851	4	
			AX910–AX975	66	
			BB890–BB912	23	
			BD110–BD127	18	
			BJ458–BJ501	—	
			BK882–BK883	2	
			BL227–BL228	2	
			BT460–BT465	6	
			BV203	1	
			DG554–DG555	2	
Havoc II	2 × R-2600-A5BO	DB-7A	AH431–AH529	99	Changes as on Boston III.
Catalina I	2 × R-1830-S1C3G	Model 28-5. U.S.N. PBY-5	P9630	1	
			W8405–W8434	30	Some lost in Singapore, 1941/2.
			Z2134–Z2153	20	Z2134, Z2136–40 to Canada.
			AH530–AH569	40	AH534 to Australia.
			AJ154–AJ162	9	
			A24.1–A24.18	18	For R.A.A.F. Changed armament.
Catalina IA	2 × R-1830-S1C3G	Model 28-5. U.S.N. PBY-5	9737–9750	14	For R.C.A.F. Changed armament.
Catalina II	2 × R-1830-S1C3G	Model 28-5. U.S.N. PBY-5	AM264–AM270	7	As Catalina I, built by N.A.F. AM268, ex-NC777 "Guba", later G-AGBJ and SM706.
Catalina IIA	2 × R-1830-S1C3G	Model 28-5. U.S.N. PBY-5	VA701–VA736	36	R.C.A.F. version transferred to R.A.F., ex-9701–9736.
Ventura I	2 × R-2800-S1A4G	L-37	AE658–AE845	88	Two retained in Canada.
Ventura II	2 × R-2800-31	L-37. U.S.A.F. B-34	AE846-AE957	12	Additional nose armament.
			AJ163–AJ537	575	Six to S.A.A.F. Used by Bomber Command on day operations.

Information in italic is unconfirmed.

U.S. Aircraft in British Service

(Continued)

the aircraft and used in conjunction with A.I. Its purpose was to illuminate enemy raiders by night, after they had been located by radar. As the Havoc could not carry armament as well as the Turbinlite—the bomb-bay contained the batteries—a scheme was evolved whereby Hurricanes accompanied the Havocs for the kill.

At least two squadrons of Turbinlite Havocs were equipped and about seventy aircraft were converted in all, but the scheme was not as effective as hoped, and was outdated by the successful development of centimetric A.I.

Consolidated Catalina. Initial British contracts for the Catalina flying-boats were placed with the Consolidated company in 1939; known by the works designation Model 28-5, these aircraft were equivalent to the U.S. Navy's PBY-1. The first Catalina (P9630) was delivered by air across the Atlantic in July 1939 and went to the Marine Aircraft Experimental Establishment at Felixstowe. Production deliveries did not begin until 1940, and the type entered Coastal Command service early in 1941.

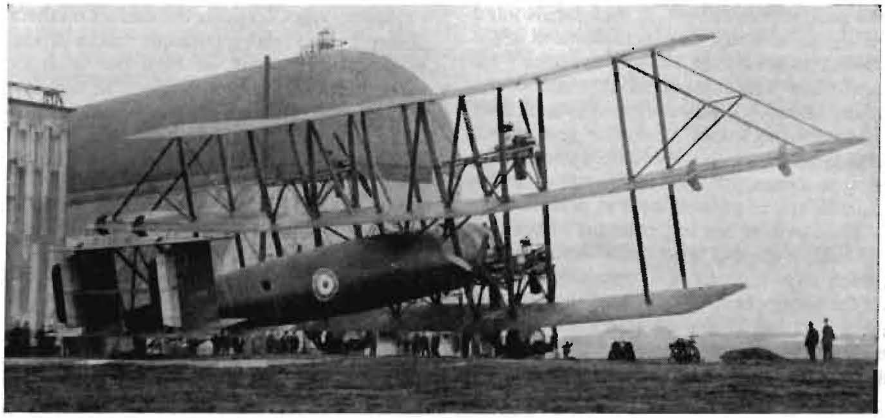
Between delivery of the prototype and first production Catalinas, a famous example of the Consolidated flying-boat was also acquired by the R.A.F. This was Guba, built in 1938 and used by the Archbold Expedition, sponsored by the American Museum of Natural History, to New Guinea. Delivered as AM268 (ex-NC777), it was taken over by B.O.A.C. in 1940 as G-AGBJ for passenger and freight services. In 1944, Guba reverted to the R.A.F., this time as SM706, and was used by Saunders-Roe at Beaumaris until mid-1945, mostly for trial installations.

Lockheed Ventura. Developed from the Lockheed Hudson as a counterpart to the civil Lodestar, the Ventura was ordered in 1940 in considerable numbers, and large quantities were supplied later under Lend-Lease. Like the Hudson, it was used principally by Coastal Command, from October 1942 onwards.

(To be continued).

Service Aircraft of the Past

THE TARRANT TABOR



Powered with six 450-h.p. Napier Lion engines in place of six 600-h.p. Siddeley Tigers as originally planned, the only Tabor completed, F1765, is here shown outside "C" Balloon Shed, Farnborough, before its fateful attempt to fly. (*Photo: Imperial War Museum.*)

THE reader may question the point of writing about an aircraft that never flew. It is, however, the writer's opinion that the originality and enterprise of the firm deserve to be recorded, even though their venture ended not only in failure, but disaster.

W. G. Tarrant was an engineer and builder of Byfleet, Surrey. The proximity of his premises to the Brooklands Motor Track, one of our centres of aviation in the early days, led to an association with aircraft at a time when a well-stocked timber yard could provide the necessary material for construction or repair of airframes.

It was not until late in the first World War that the construction of their own aircraft was contemplated. This was urged by the firm's chief engineer, Capt. P. T. Rawlings, D.S.C., who had engineering and flying experience of the early Handley Page bombers. He projected an aircraft of unprecedented proportions, embodying Tarrant patent constructional methods.

With the restrictions of wartime, a private venture of this nature could succeed only with official sanction. In authorising the construction of two such machines (Nos. F1765 and F1766), the Air Ministry made certain stipulations. The machines were to be capable in design of bombing German industrial centres from home bases; the constructional methods must be simple to facilitate the employment of female labour and the materials used were to be indigenous.

A tapering, tubular fuselage over seventy feet long, took shape at Byfleet, built on an all-wood girder system, glued and screwed. It was covered by 2-ply poplar slats with a final fabric covering. The triplane superstructure which was to have a maximum span of some 130 feet, presented accommodation difficulties at Byfleet. An offer of "C" Balloon Shed at Farnborough for erection was accepted and a specially-made trolley moved the fuselage to the Royal Aircraft Establishment.

Hostilities ceased before the machine was completed and work temporarily lapsed, but a new field had been opened for commercial aircraft. The Tarrant Triplane was thought to epitomise the passenger-carrying aircraft of the future and its construction was pressed. Hitherto its existence had been an official secret, now, on 13th March 1919, the Air Minister, Major-General Seely, made vague references to a giant transport aircraft when introducing the 1919-20 Air Estimates.

For reasons unexplained this aircraft was named the Tabor, after a small Bohemian community. Its main details were as follows:

Wing Span	
Mid wing	131 ft. 3 in.
Upper and Lower	98 ft. 5 in.
Length of fuselage	73 ft. 2 in.
Weight (fully loaded)	44,672 lbs.
Power Plant	*6 × 450-h.p. Napier Lions

At daybreak on 26th May 1919 the first Tabor, F1765 was drawn on to the Farnborough airfield for its initial test. For two miles, using its lower engines, the machine taxied round the airfield. It tended to swing slightly and the watching experts took this as indicative of insufficient rudder control. Then, as the top two engines were opened up on the actual take-off run—the whole machine tilted up and buried its nose in the ground. The giant fuselage was left standing upright, towering some seventy feet above the wreckage. The Tabor had made its first and last attempt to fly and poor Rawlings had lost his life.

Some years elapsed before the accident was fully investigated; meanwhile exhaustive tests were carried out by the Royal Aircraft Establishment. Even before the accident a mock-up of a Tabor fuselage had been tested to destruction; there was, however, no evidence of structural weakness from this or from an examination of the wreckage. The design itself was subjected to rigorous examination and a scale model was made for wind-tunnel tests. In general the design was considered sound. A possibility of pilot error was mooted, but the final report was by no means conclusive. It would seem that the sudden surge of power of the upper engines in relation to the lower engines caused the accident, but the responsibility for this was not placed.

Bruce Robertson

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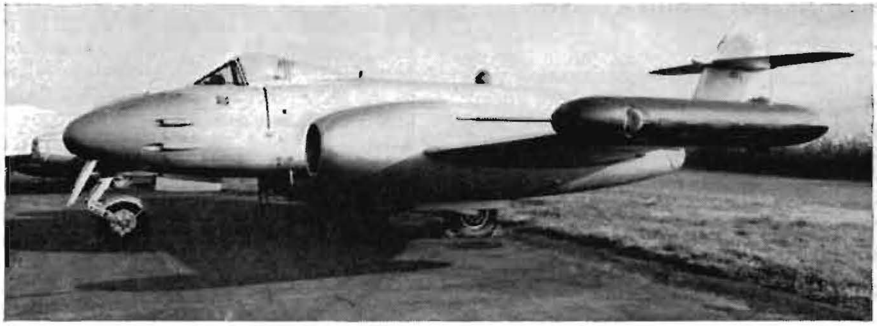
* *4 mounted tandem fashion driving two pusher and two tractor airscrews mounted between the mid and lower planes. 2 mounted between mid and upper planes driving tractor airscrews.*

The Journal of a Roving Spotter



Latest in the series of British pilotless target aircraft to be announced is the Meteor U Mk. 15, illustrated here. Camera containers are at the wingtip, as on the Firefly U Mk. 8. The Meteor U Mk. 16 is a similar conversion of the Meteor 8.

FOR all that this column devotes a good deal of its space to the interests of the collector/enthusiast, it is the desire and ability to identify any aeroplane at sight which constitutes the basis of the hobby for most of us. This is endorsed by many of the letters I receive from readers, telling of their spotting experiences—and this gives me a chance to say that these letters are always most welcome, although it is not always possible for me to answer them in person.

Since writing my last column, I have had the chance to do a little "pure" spotting for myself over a continuous two-week period on the south coast. It was a welcome change from spotting in and around London, and my experience supported the view that this area of central southern England offers a greater diversity of types than any other part of the country.

On 14 successive days, I noted 55 different basic types, the daily average being 17, and the maximum daily total 29, achieved twice. These figures were obtained without using binoculars; consequently some distant types went unrecorded. They were also obtained with only one visit to an aerodrome (Shoreham), which produced only one type not seen in the air also. The types seen were, of course, flavoured by the proximity of Shoreham, Lee-on-Solent, Ford, Tangmere and Thorny Island, but for all that they ranged from a B.A.C. Drone to an Avro Vulcan.

* * *

The Comet which took Mr. Nigel Birch and his party to Moscow for the Tushino Air Display at the end of June was XK670, now officially designated T. Mk. 2, together with XK669. These two Comets have been set aside by Transport Command for training and crew evaluation duties in No. 216 Squadron; the eight C. Mk. 2s which will follow will differ in various internal details, in particular relating to a strengthened freight-carrying floor, but will probably be externally similar.

Other Comet news is that the two Comet 1As of the R.C.A.F. are to be modified in this country before returning to service in Canada, and that two of the Air France 1As, intended for service with the R.A.F. on special duties in due course, have been given British civil registrations for the flight back to Britain. These are G-AOJT (ex-F-BGNX) and G-AOJU (ex-F-BGNY). They are officially listed as Comet 1.XB. F-BGNZ, which was already in this country is now flying as G-5-23.

* * *

Enthusiasts who pride themselves on their ability to distinguish different marks of the same aeroplane will be hard put to it to recognise at sight new versions of the Sea Hawk and Gannet recently announced. They are the Sea Hawk F.B. Mk. 5 and F.GA. Mk. 6, which are respectively the same as the F.B. Mk. 3 and F.GA. Mk. 4 but have a Nene 103 in place of Nene 101; and the Gannet A.S. Mk. 4 with a Double Mamba 101 in place of the Double Mamba 100 in the A.S. Mk. 1.

The use of duty prefixes on the mark numbers of British military aircraft is now firmly established, of course. Although a few uses are recorded on pre-war aircraft, it was not until 1944 or so that the system became standard. Since then, well over thirty different categories have been used officially; a few others, unfortunately, became current unofficially, such as RP, for rocket-carrying fighters.

The practice of combining two duty prefixes has now grown up, as in Valiant B.(PR) Mk. 1 and Pembroke C.(PR) Mk. 1, but in these cases it signifies dual role aircraft, whereas in the U.S.A.F. system, similar combinations indicate an aircraft adapted from its primary mission for an alternative role. The British prefixes also tend increasingly to be subdivided, as in the F.AW, F.GA and B(I) roles. Another such division which is to come into use soon, I hear, is B(K), for bomber/tankers to be used in the flight refuelling operations.

* * *

Talk of duty prefixes and of Flight Refuelling, in this case the company not the system, leads me neatly to my next topic—pilotless aircraft. The latest duty prefix announced is U, for unpiloted drones (primarily for use as guided missile targets) and two such types are the Meter U. Mk. 15 and U. Mk. 16, conversions by Flight Refuelling, Ltd., respectively, of the Meteor 4 and Meteor 8.

A lengthy article could be written on the subject of British pilotless aircraft, but I thought it would be of interest to record here, very briefly, a few pertinent facts on these which spring readily to mind.

Aerial Target. This soubriquet was applied to several assorted types built at the Royal Aircraft Factory, Farnborough, during and immediately after World War I, and by private individuals such as A. M. Low. One batch was numbered A8957–A8962. They were never employed operationally but provided some useful experience on control systems and instruments.

Larynx. A very little-known aeroplane, a new illustration of which I print here, which was a continuation of the work at the R.A.E. on pilotless bombers. Powered by an Armstrong Siddeley Lynx, the Larynx of 1928 was designed to be launched from a destroyer and to carry a 250-lb. bomb for 200 miles at 200 m.p.h.

Fairey Queen. The first of the Queen series of pilotless radio-controlled aircraft for use as targets in ground-to-air firing. Conversions (believed to total three) from Fairey IIIFs at the R.A.E., distinguished by the 10 degrees of dihedral on the wings. Flown on wheels and floats.

D.H. Queen Bee. A radio-controlled target version of the Tiger Moth. This was produced in considerable quantities both before and during World War II.

Airspeed Queen Wasp. A radio-controlled target of original design to Spec. Q.32/35 (two prototypes, K8887 and 88). Production batch of sixty-five was ordered, but only five of these, P5441 to P5445, were delivered, early in the war.

Curtiss Queen Seamew. A radio-controlled target version of the Curtiss SO3C-4 supplied under lend-lease. Total of thirty delivered: JX663–669, JZ771–774 and KE286–304.

Miles M.50 Queen Martinet. Originally Martinet III, a radio-controlled target version of the Martinet II. Nearly three hundred were ordered, commencing RH122, but deliveries apparently totalled sixty-five.

Firefly U.8. Target drone version of the Firefly 7 for G.W. programme. Total of forty produced.

Firefly U.9. Target drone conversion of the Firefly 5.

In addition, incidentally, to their work on pilotless Meteors, Flight Refuelling Ltd., worked on a Lancaster for similar operation as a special research project.

* * *

I am now able to print the full list of names to be applied to the B.E.A. fleet of Viscount Major 802s. These, like the existing 701s, are in the Discovery class, although the term Explorer more nearly describes the work of these Viscounts' namesakes. The B.E.A. Viscount Major 806s will be named after discoverers in the field of science rather than exploration—such as Newton, Darwin, Faraday, Watt and Stephenson.

The Viscount Major 802s are named as follow:

G-AOJA	Sir Samuel White Baker
G-AOJB	Stephen Borough
G-AOJC	Robert O'Hara Burke
G-AOJD	Sebastian Cabot
G-AOJE	Sir Alexander Mackenzie
G-AOJF	Sir George Somers
G-AOHG	Richard Hakluyt
G-AOHH	Sir Robert McClure
G-AOHI	Charles Montagu Doughty
G-AOHJ	Sir John Mandeville
G-AOHK	John Hanning Speke
G-AOHL	Charles Sturt
G-AOHM	Robert Machin
G-AOHN	Alexander Gordon Laing
G-AOHO	Samuel Wallis
G-AOHP	James Weddell
G-AOHR	Sir Richard Burton
G-AOHS	Robert Thorne
G-AOHT	Ralph Fitch
G-AOHU	Sir George Strong Nares
G-AOHV	Sir John Barrow
G-AOHW	Sir Francis Younghusband
G-AORC	Richard Lander
G-AORD	Arthur Phillip

Other Viscount notes, since my last instalment, are as follows:

Type 732. G-ANRS, after being used on charter by B.E.A. as George Bass, has now been sold once again to Middle East Airlines and will be registered in the Lebanon as OD-ACH.

Type 745. Capital Airlines have announced their intention of ordering fifteen more of this type, bringing the total to seventy-five.

Type 782. Series 770 for Persia.

Type 785. Six Series 770 for L.A.I. of Italy.

Type 815. Three Series 810 for Pakistan International Airlines (not T.A.A. as I gave previously).

Type 816. Two Series 810 for Trans-Australia Airlines.

* * *

Squadron markings, in the form of a yellow bell on an azure background, are now carried by the Canberra P.R. Mk. 7s of No. 80 Squadron at Laarbruch. The marking honours Major Bell, the squadron's first commander.

Excelsior might well be the name of G-AMYW (see p. 199, *Air Pictorial*, June 1956), the Dakota with a strange device, and which has been causing some excitement among spotters recently. Owned and operated by Hunting Geophysics Ltd., it has a variety of devices for the detection of various types of mineral deposit from the air. These include the usual tail-mounted magnetometer; electromagnetic detectors carried on each side, and above the fuselage on spreaders, and a scintillation counter which, for operation, is trailed on a 500-ft. cable from beneath the fuselage.

* * *

I have written lately of American designations, and now revert to the subject again to mention a new series of numbers which are not generally known. These are Weapons System numbers, applied to projects in the Phase I, or design tender stage, and they can be compared with British Specification numbers. Those of which I have a note so far are as follow:

WS104. North American SM64 Navaho long-range missile.

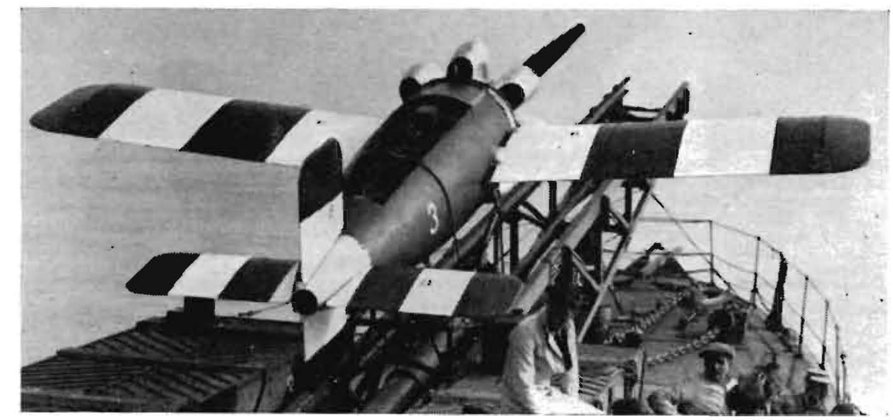
WS107. Convair SM65 Atlas ICBM, under development.

WS110A. Project for a chemically-fuelled (in lieu of kerosene) bomber to fly at Mach 2 at 70,000 ft. over 10,000 miles. Engines by Aerojet, 35,000-lb. thrust. Convair design abandoned, Boeing and North American continuing work.

WS125. The U.S.A.F. nuclear-powered bomber. Studies by Convair (GEC engines) and Lockheed (P. & W. engines).

WS202A. Long-range interceptor project, now abandoned through lack of funds. Designs were by Lockheed, Northrop and North American.

Few readers will recognise this interesting aeroplane—one of the Larynx pilotless flying bombs built at the R.A.E. in 1927. Launching trials were made at sea. (*Crown copyright photograph, by permission of H.M. Stationery Office.*)



WS300A. Supersonic fighter bomber project, now abandoned through lack of funds. Designs were by North American and Republic.

WS302A. Supersonic tactical bomber project. Douglas design abandoned, contract for prototypes awarded to Martin.

WS315A. Martin Titan I.C.B.M. with North American 335,000-lb. thrust liquid rocket engine.

* * *

The aide-memoire on the Hunting Percival Pembroke with which I close this month produces a total of eighty-nine machines built or ordered including G-AOJG, the Prince Series V, which is a Pembroke in civil guise. Other Pembroke orders are in the offing, including one of thirty-three for Germany, and if the Prince V is a commercial success, total production should easily exceed one hundred.

Pembroke C. Mk. 1. Two Leonides 127 engines. Staff transport for R.A.F. service. Total of forty-six, commencing WV698. Four diverted to Royal Rhodesian Air Force.

Pembroke C(PR). Mk. 1. Six aircraft with provision for cameras in fuselage, for dual role as communication/reconnaissance aircraft with No. 81 Squadron.

Pembroke C. Mk. 51. Export version for Belgium; bomb-aiming nose. Twelve delivered, RM1/OT-ZAA to RM12/OT-ZAL.

Pembroke C. Mk. 52. Export version for Sweden, as R.A.F.'s C. Mk. 1. Sixteen delivered, 83001 to 83012.

Pembroke C. Mk. 52/2. Export version for Denmark. Six ordered.

Pembroke C. Mk. 53. Export version for Finland. Two delivered, PR1 and PR2.

"Aeroscribe", July 1956

NUMBER 1838 Rainham Squadron A.T.C. will be glad to receive information of any unserviceable aircraft parts, mainplanes, tail units, etc., or even a written-off aircraft for instructional purposes. The Squadron will make any arrangements for transport. A small sum could be found for a written-off aircraft. Will readers who can help please write to the Officer Commanding, A.T.C. No. 1838 Rainham Squadron, Ferry Lane, Rainham, Essex.

Japanese Army Aircraft

By Richard M. Bueschel

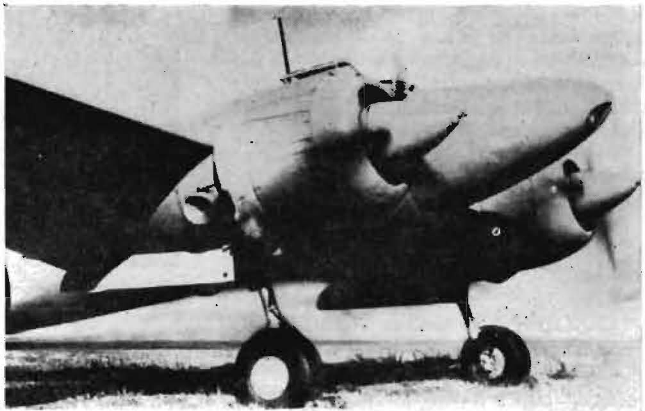
Illustrated by Shorzoe Abe

Part III

MITSUBISHI: The Mitsubishi Heavy Industries Co. (Mitsubishi Jokogyo K.K.) was the second largest military producer in Japan, concentrating on bomber and reconnaissance types. First modern monoplane bomber of the J.A.A.F. was the Type 93 Heavy Bomber (Ki.1-I and Ki.1-II). Based on the use of Junkers patents, this aircraft formed the backbone of the J.A.A.F. heavy bomber units until replaced by the Type 97. Some were still in service as trainers and transports during the war. The Type 92 Long-Range Super Heavy Bomber (Ki.20) was a four-engined monster based on the Junkers G-38, and produced under licence as the Junkers K-51. At least one was still in existence as late as September 1943.

In February 1936 the A.A.H. issued specifications for a new twin-engined heavy bomber capable of operating in severe cold as well as tropical climates and equal in performance to contemporary Western models. Mitsubishi submitted the Ki.21 Experimental Heavy Bomber, powered by two Ha.6 radials of 850 h.p. After comparative tests against the Nakajima Ki.19 the J.A.A.F. ordered Mitsubishi to power their aircraft with the Ha.5-KAI of 950 h.p., and the ship entered production as the Type 97 Heavy Bomber, Model 1a (Ki.21-Ia "Sally"). Armament was three 7.7-mm. machine guns. Deliveries began late in 1937.

The J.A.A.F.'s lack of heavy bombers in this period led to the purchase of approximately one hundred Fiat BR.20 bombers from Italy, and they entered squadron service as the Type I Heavy Bomber. They were quickly withdrawn when it was discovered that its performance left much to be desired, and after a number were destroyed in frequent ground-looping accidents. Type 97 production was stepped up to fill this gap, and the next version was the Model B (Ki.21-Ib) armed with five to six 7.7-mm. machine guns, followed by the Model C (Ki.21-Ic), armament unknown. These aircraft were in service from the beginning of the Sino-Japanese war and were active in the opening days of the Pacific War in attacks on the Philippines, Hong Kong and Burma. They were later used as advanced bomber trainers and paratroop transports, as well as bombers in less active theatres.

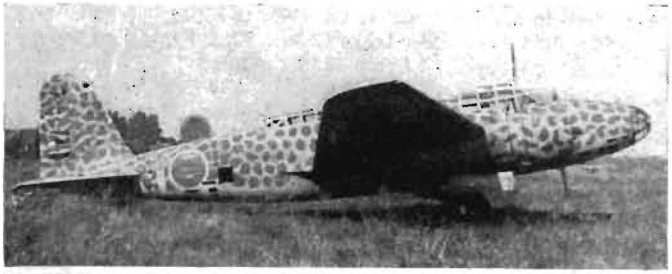

Mitsubishi Type 100 Command Reconnaissance, Model 2 (Ki.46-II "Dinah").

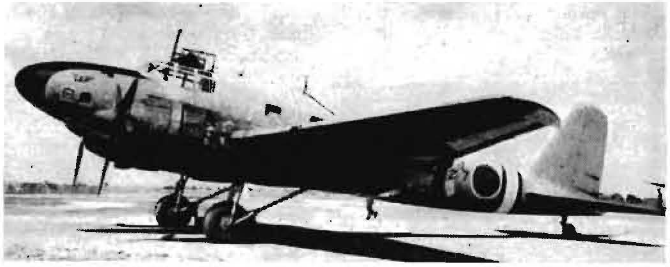
In December 1940 the prototype Model 2 was test flown. Outwardly similar to the Model 1, it was powered by two Ha.101 radials of 950 h.p. It entered production as the Type 97 Heavy Bomber, Model 2a (Ki.21-IIa "Sally"). Armament was the same as the 1b with the addition of a tail "stinger", a remotely operated M.G. at the base of the rudder firing to the rear. This was followed by the Model 2b and 2c in which the long dorsal enclosure was replaced by a mechanically-operated turret. The Model 2 was the mainstay of the heavy bomber units throughout the war years until replaced by the Ki.67 late in 1944. Mitsubishi built a total of 1,702 Ki.21s.

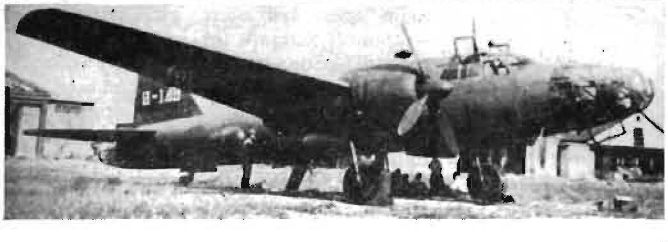
Work on a transport version of the Type 97 began early in 1940 when a Ki.21-I was modified as the civil Mc.21 and tested by Japan Air Lines. Power was two Ha.5-KAI radials. The civil Mc.20 was based on this prototype, and the military model of the Mc.20 was first flown in July 1940. Powered by the Ha.5-KAI, it entered production as the Type 100 Transport Plane, Model 1 (Ki.57-I "Topsy"). In 1942 the power plants were changed to Ha.102 radials of 1,050 h.p. and it was built as the Model 2 (Ki.57-II). A total of four hundred and ninety-eight, all models, were built.

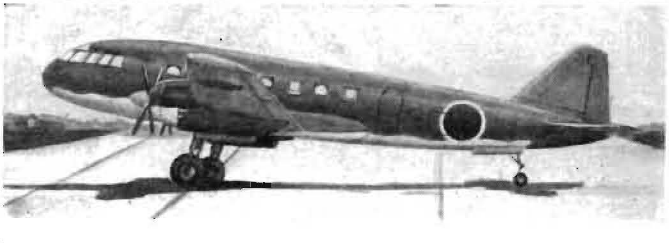
Designed as a Type 97 replacement, the Ki.67 Experimental Heavy Bomber was completed in December 1942. Power was two 1,900-h.p. Ha.104 radials and armament four 12.7-mm. machine guns and one 20-mm. cannon. It entered production in 1944 as the Type 4 Heavy Bomber, Model 1a (Ki.67-Ia "Peggy"). The Model

Top left: Mitsubishi Type 97 Heavy Bomber, Model 2a (Ki.21-IIa "Sally"). *Right:* Mitsubishi Type 100 Transport, Model 2 (Ki.57-II "Topsy"). *Bottom left:* Mitsubishi Type 4 Heavy Bomber, Model 1b (Ki.67-Ib "Peggy"). *Right:* Mitsubishi Ki.97 Experimental Transport.









Top to Bottom: Mitsubishi Ki-83 Long-Range Fighter; Mitsubishi Type 100 Operations Trainer, Model 2—Modified (Ki.46-II-Kai "Dinah"); Mitsubishi Type 100 Command Reconnaissance, Model 3a (Ki.46-IIIa "Dinah").

1b (Ki.67-Ib) soon followed, featuring the addition of a dorsal turret but otherwise similar to the 1a. A total of five hundred and forty-four of both models were built by Mitsubishi. Experiments were conducted on a Ki.67 equipped with gas turbine superchargers and powered by two Ha.104ru radials. Top speed was 345 m.p.h. at 20,000 ft. One was fitted with Ha.214 radials, and another modified as a parent aircraft for testing the I-Go-A guided missiles. The sole prototype of an improved model, the Model 2 (Ki.67-II), was fifty per cent complete when the war ended. Power was two Ha.214s.

First fighter version of the Type 4 was the Ki.69 Escort Fighter for convoy/fighter work, but the project was dropped. Following Rikugun success in converting a number of Type 4s as Ki.104 interceptors, the Mitsubishi Co. began work on the Ki.109 Interceptor. Essentially a Ki.67-Ia airframe, the ship was modified to carry a 75-mm. cannon in the nose plus one 12.7-mm. machine gun. Work began in January 1944 and the first model was completed in August. Forty-four were built and the type entered service. The Ki.109s never engaged B-29s in combat as they were unable to intercept them at their operating altitude. Plans for the Ki.112, a multi-seat fighter version of the Ki.67, were dropped.

The Ki.67 was also redesigned as a transport in a manner similar to the Mc.20. The wings and tail surfaces were retained but a new fuselage of wider cross section was projected. Designated the Ki.97 Experimental Transport it was planned to carry twenty-one passengers plus a crew of two. The project was not adopted by the J.A.A.F.

Type 93 Light Bomber (Ki.2-Ia and Ki.2-Ib) aircraft were widely used in advanced training schools during the war. Based on the Junkers K-37, imported from Sweden in 1931, the Ki.2 was in production until late 1937. Power was two Ha.1 radials of 570 h.p. An experimental version with enclosed cockpits was built in 1937 as the Model 2 (Ki.2-II "Louise"), powered by two Ha.8 radials of 550 h.p., but it was not adopted by the Army. A total of one hundred and seventy-four Ki.2s were built.

In 1935 the J.A.A.F. purchased an A5M1 carrier fighter for test purposes as the Ki.18. Mitsubishi later submitted two A5M4 models in the Type 97 fighter competition as the Ki.33, but the aircraft was not ordered in quantity. Later fighter projects were the twin-engined Ki.39 and the 2,600-h.p. Ha.203-II powered Ki.73 "Steve", but these were not built.

First important Army fighter was the Ki.83 Experimental Long-Range Fighter. Originally conceived as a single-engined type, the design evolved into a sleek mid-winged aircraft powered by two supercharged Ha.112ru radials of 2,200 h.p. Four prototypes were built and the first flight was in October 1944, but the war ended before plans to mass produce it were completed. Although a J.A.A.F. project, the J.N.A.F. was also interested in the type as a land-based interceptor. A Ki.103 version was also projected.

Started as a joint Army-Navy project, the Ki.200 *Shusui* (Swinging Sword) was the Army version of the J.N.A.F. J8M1 interceptor. Based on the Messerschmitt Me 163b, plans were brought to Japan via submarine. Only one J.A.A.F. model was completed and it was shipped to Kashiwa AFB for testing. Due to fuel leakage in the Toku RO.2-II rocket unit the first test flight was postponed and the aircraft was never flown before the war ended. A few Navy MXY7 gliders were assigned to the J.A.A.F. for training purposes, but Ki.200 development was stalled until taken over by Rikugun as the Ki.202.

In the spring of 1937 a Japanese monoplane known as the *Kamikaze* (Devine Wind) made a record flight from Tokyo to London. Although licensed as a civil type it was actually a secret military prototype of the Ki.15 Experimental Command Reconnaissance. This type entered production in 1937 as the Type 97 Command Reconnaissance (Ki.15-I "Babs") powered by the 550-h.p. Ha.8-II radial. It was built for the J.N.A.F. as the C5M1. The Type 97 served throughout the war as a reconnaissance type, and later as a trainer. The Model 2 was built in 1939 and entered limited production as the Ki.15-II, and the J.N.A.F. C5M2. Power was the 900-h.p. Ha.26-I. A total of four hundred and thirty-five Ki.15s were built. A Ki.15-III model was projected but never built. Power was to have been the 1,050-h.p. Ha.102.

Probably the most outstanding J.A.A.F. service aircraft, the Ki.46 "Dinah" was first flown in November 1939. Designed as a replacement for the Ki.15 series, successive development kept it in first-line service throughout the war. First production model was the Type 100 Command Reconnaissance, Model 1 (Ki.46-I) powered by two Ha.26-I radials and armament one 7.9-mm. machine gun. Similar to the Model 1, power was increased on the Model 2 (Ki.46-II) by use of 1,050-h.p. Ha.102 radials. Performance proved outstanding, and data for the Type 100 was requested by the *Luftwaffe* with an eye to producing the type in Germany. A barter agreement was worked out as part of the Japanese-German Technical Exchange Programme but negotiations were later dropped by the J.A.A.F. A modified version of the Model 2 was known as the Type 100 Operations Trainer (Ki.46-II-KAI). A third seat was added which altered the cockpit enclosure and the type was used for radio and navigational training.

In March 1943 an advanced model was tested. Powered by Ha.112-II radials of 1,500 h.p., the Model 3a (Ki.46-IIIa) had a higher operational ceiling than the earlier models. Featuring an entirely new nose section it had a top speed of 394.6 m.p.h. at 19,680 ft. Armament was still the single 7.9-mm. gun, the aircraft depending upon its speed for defence. Six hundred and fifty-four Model 3a's were built and some were later modified by Rikugun as interceptor fighters. Somewhat heavier armed was the Type 100 Ground Attack, Model 3b, an experimental model based on the Rikugun Ki.46-III-KAI. It carried a 37-mm. cannon plus two 20-mm. cannon in the nose. A Model 3c was projected, armed with one or two 20-mm. cannon.

Ultimate development of the Ki.46 series was the Ki.46-IVA Experimental Command Reconnaissance, regarded as the masterpiece of the J.A.A.F. Power was two supercharged Ha.112-IIru radials of 1,500 h.p. Planned mass production never got under way and only four were completed. A Model 4b Ground Attack was projected but not built. All told, Mitsubishi built 1,738 "Dinahs", a number of which were allotted to the J.N.A.F. for land-based reconnaissance use.

Projected as the Ki.46 replacement, the Ki.95 was a Command Reconnaissance version of the Ki.83 fighter. The project was dropped in November 1943 with the advent of advanced models of the Ki.46.

A bomber version of the Ki.15, the Ki.30, entered production in 1937 as the Type 97 Light Bomber (Ki.30a and Ki.30b "Ann"). It was notable as the Army's first aircraft adopting cantilever wing flaps, a twin-row radial engine, variable-pitch propeller and bomb bays. Six hundred and twelve were built by Mitsubishi and the type

(*Continued overleaf*)

saw service in China, the Philippines and was the standard light bomber of the Royal Thai Air Force. Power was the 850-h.p. Ha.5.

Essentially a Ki.30 with the wing lowered and the bomb bay removed, the Ki.51 "Sonia" entered production in 1939 as the Type 99 Military Reconnaissance (Ki.51a) and the Type 99 Ground Attack (Ki.51b). It was used in great numbers—1,472 were built by Mitsubishi—by the J.A.A.F. throughout the war. Power was the 900-h.p. Ha.26-II.

Final Mitsubishi project was the experimental I Weapon Type 1, Model A (I-Go-A) guided missile. Designed for launching from a Ki.67 parent aircraft, the I-Go-A was a rocket-powered monoplane with a 1,760-lb. warhead. Ten test models were built in 1944.

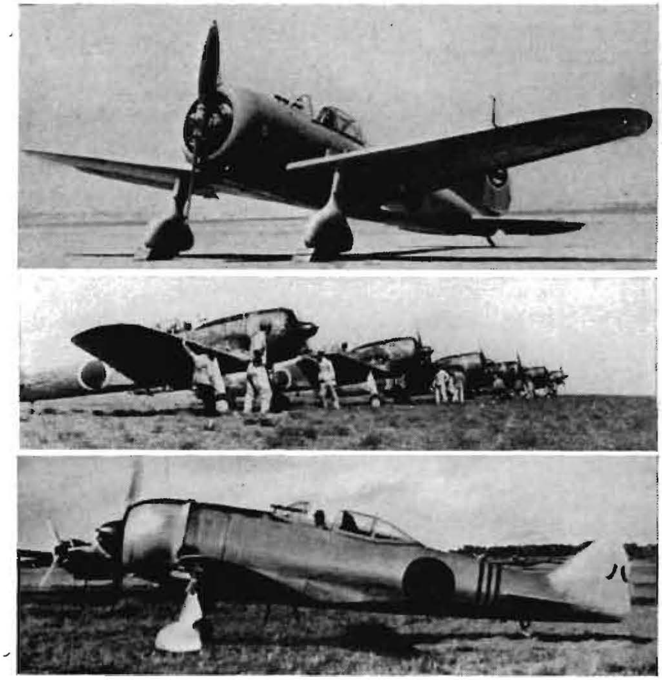
NAKAJIMA: Top wartime aircraft producer in Japan, the Nakajima Aircraft Co. (Nakajima Hikoki K. K.) was noted for its series of monoplane fighters. The firm's first low-wing fighter was the Ki.8 two-seater of 1934, powered by the Ha.8 of 550 h.p. The project was dropped after five prototypes were built. This was followed by the Ki.11 Air Defence Fighter, a single-seat interceptor also powered by the Ha.8. Built for the Type 95 fighter competition it was rejected in favour of the Kawasaki Ki.10. Of four prototypes built one was later sold to the Asahi Press as a communications type and designated the AN-1. It was also submitted to the J.N.A.F. as the 9-Shi A5N1 fighter.

In 1936 two projects were undertaken that set the pattern for future Japanese fighters. First was the Ki.12 Experimental Heavy Fighter powered by a Hispano-Suiza 12Ycrs. It mounted a motor cannon firing through the spinner hub and was the first Japanese fighter with a retractable landing gear. Although the design was not accepted it gave Nakajima invaluable experience in modern design and construction techniques. The second project was the private venture PE Fighter, a single-seat, low-wing, radial-powered monoplane with a fixed landing gear. The sole prototype was completed in July 1936. J.A.A.F. interest prompted a redesign and the aircraft was submitted in its new form as the Ki.27 Experimental Fighter powered by the 650-h.p. Ha.1a. Three prototypes were built varying in wing area and fittings, the first flying on 15th October 1936. The 200-sq.-ft. model was chosen and ten service test models were built for the Type 97 fighter competition. The Ki.27 was chosen for its outstanding manoeuvrability and entered production as the Type 97 Fighter, Model A (Ki. 27a "Nate"), the first low-wing monoplane of the J.A.A.F.

The Type 97 gave the J.A.A.F. fighter equality with foreign powers for the first time, and Ki.27a's rapidly replaced the earlier Ki.10 fighters in 1938. The "Nate" was used extensively in China and the Russo-Japanese border disputes prior to the Pacific War, and was the Army's standard World War II fighter until replaced by the Ki.43 in late 1942. Some were still in service as fighters in 1945 but most had been relegated to advanced training schools. Later production models had a revised cockpit hood and were known as the Ki.27b. Both models were powered by the 650-h.p. Ha.1b and had an armament of two 7.7-mm. machine guns. Nakajima built 2,019 of these fighters. Three models of an improved version were built in 1940 as the Ki.27-KAI but were dropped in favour of the Ki.43 and Ki.44.

Built in 1939 as a replacement for the Type 97, the Ki.43 was initially regarded as an unsatisfactory substitute by many Army pilots due to its inferior manoeuvrability, although it had a higher top speed and generally better performance. A fixed landing gear was fitted to one of the prototypes in order to overcome the weight problem and increase manoeuvrability, but the idea was abandoned. Production began in 1941 as the Type 1 Fighter, Model 1a (Ki.43-Ia "Oscar") powered by the 1,000-h.p. Ha.25 and armed with two 7.7-mm. machine guns. This was followed by the Model B (Ki.43-Ib) with three 7.7-mm. guns, and the Model C (Ki.43-Ic) with two 12.7-mm. guns. Seven hundred and sixteen model 1s were built by Nakajima. Known as the *Hayabusa* (Falcon) it served as a standard Army fighter throughout the war, and was also the standard Royal Thai Air Force fighter.

In February 1942 a new model, powered by the 1,150-h.p. Ha.115, was completed. After testing of five prototypes production began as the Model 2a (Ki.43-IIa). In June 1942 a clipped-wing version was tested and later produced as the Model 2b (Ki.43-IIb). Both models carried two 12.7-mm. guns and two 550-lb. bombs. Final Nakajima development was the Model 3a (Ki.43-IIIa) powered by the Ha.33/42. The prototype was completed in September 1944 and production began soon after.

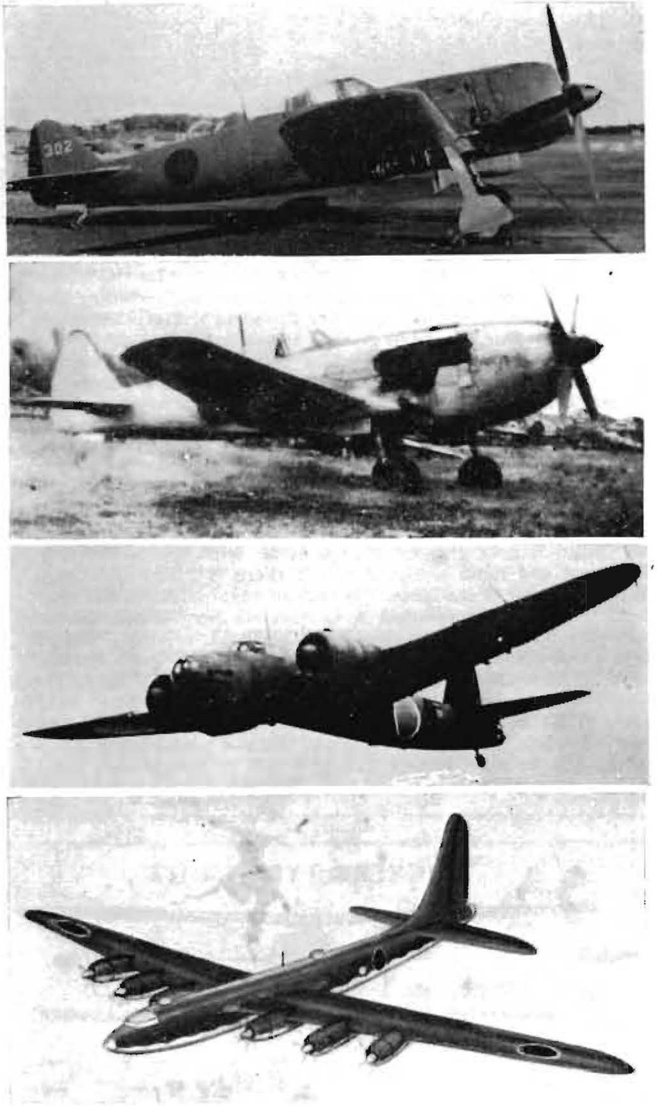


Top to Bottom: Nakajima Type 97 Fighter, Model B (Ki.27b "Nate"); Nakajima Type I Fighter, Model 2a (Ki.43-IIa "Oscar"); Nakajima Type 2 Fighter, Model 2b (Ki.44-IIb "Tojo").

Designed to a new set of specifications the Ki.44 was conceived as a heavy interceptor fighter. Ten prototypes were built, the first in August 1940, and formal Army acceptance came after successful completion of tests against the Me 109E-2. The Messerschmitt fighter was considered for production by the J.A.A.F. but was dropped when it was found to be inferior to the Nakajima product. Test production of the Ki.44 began as the Type 2 Fighter, Model 1a (Ki.44-Ia "Tojo"), powered by a 1,250-h.p. Ha.41 and armed with two 7.7-mm. and two 12.7-mm. machine guns. Forty were built. First large production model was the Model B (Ki.44-Ib) powered by the 1,450-h.p. Ha.109 and carrying four 12.7-mm. guns. This was followed by the Model C (Ki.44-Ic) with modified landing gear covers. The fighter was popularily known as the *Shoki* (Demon).

A retracting tail wheel, modified cockpit hood and landing gear were incorporated in the Model 2a design but the type did not enter production. These features were carried over to the Model 2b (Ki.44-IIb), armament four 12.7-mm. guns, and the 2c (Ki.44-IIc), armament two 12.7-mm. guns and two 40-mm. cannon. Also powered by the Ha.109 these versions were produced in quantity. A few Model 3s (Ki.44-III) were built with a revised rudder and lower gross weight. Armament was two 12.7-mm. guns and two 20-mm. cannon. A total of 1,223 Ki.44s were built. They were mainly used for defence of the home islands, particularly in the Tokyo and Kobe areas. Some were also stationed in southern Manchuria.

Top production J.A.A.F. fighter and last Army fighter produced in quantity by the firm, the prototype Ki.84 was tested early in 1943. A single-seat, low-wing type known as the *Hayate* (Gale), it owed much to the earlier Ki.43 and Ki.44 fighters. Power was the 1,900-h.p. Ha.45 radial, and production began in 1944 as the Type 4 Fighter, Model 1a (Ki.84-Ia "Frank") with two 20-mm. cannon and two 12.7-mm. guns; followed by the Model 1b (Ki.84-Ib), four 20-mm. cannon; and the Model 1c (Ki.84-Ic), two 20-mm. and two 30-mm. cannon. Although an outstanding airframe, the Type 4's performance suffered because of the unreliability of the Ha.45 power plant, plus poorly-designed hydraulic and fuel pressure systems. Production Ha.45s were of poor quality and varied greatly in performance ratings. Field maintenance was exceedingly difficult and many Ki.84s were grounded due to engine failures. The landing



Top to Bottom: Nakajima Type 4 Fighter, Model Ia (Ki.84-Ia "Frank"); Nakajima Ki.87-I Experimental High Altitude Fighter; Nakajima Type 100 Heavy Bomber, Model 2a (Ki.49-IIa "Helen"); Nakajima Project Z Experimental Heavy Bomber.

gear was weak and liable to snap on contact due to poor hardening of metal used in its construction. Attempts were made to correct these defects in later production models by means of an improved hydraulic system, landing gear and a low-pressure fuel injection model of the Ha.45, but the problem was never completely solved. Design projects included the Model 2 (Ki.84-II) and the supercharged Model 3 (Ki.84-III) powered by the Ha.45ru. Nakajima also built one prototype of the Ki.113 *Steel Hayate* in January 1945. The cockpit carried heavy armour plate to protect the back of the pilot.

On 4th June 1945 three new projects were undertaken, the Ki.84N (Ki.117) and Ki.84P powered by the 2,500-h.p. Ha.44/13 and the Ki.84R powered by the Ha.45/44. The Ki.84R design was eighty per cent complete at the war's end.

Last experimental fighter completed by the firm was the Ki.87-I High Altitude Fighter, first flown in April 1945. Powered by the 2,400-h.p. Ha.44/21 the Ki.87-I was built as a B-29 interceptor. A turbo-supercharger was fitted to the side of the fuselage and plans were made to produce five hundred aircraft. Only one prototype was completed. A Ki.87-II version, powered by the 3,000-h.p. Ha.217 was projected. The supercharger was to be moved to the bottom of the fuselage.

Following successful design and patent negotiations with Messerschmitt A.G. in Germany, Nakajima undertook design and construction of the Ki.201 *Karyu* (Fire Dragon) twin-jet interceptor based on the Me 262. Regarded by a group of J.A.A.F. officers as the white hope of Army interceptor units it became the centre of a controversy within the A.A.H., when the Rikugun Ki.202 was chosen as the priority Army interceptor project. The prototype was under construction at the war's end. Power was to be two Ne.230 or Ne.130 jet units. Nakajima fighter projects not built were the Ki.37, Ki.53 and Ki.75 multi-seat fighters; Ki.62 interceptor powered by the Ha.140 in-line; Ki.63 heavy fighter and the Ki.101 night fighter.

First modern Nakajima heavy bomber was the Ki.19, based on the Nakajima-produced Douglas DC-2. It was passed over in favour of the Ki.21 and one of the prototypes was later sold to the Asahi Press as the N-19. Following pre-war practice a production order for the Ki.21 was given to Nakajima as a participant in the Type 97 competition. Three hundred and fifty-one were built. The Nakajima Ki.49 was designed in 1939 as a Type 97 replacement, based on the firm's experience in Ki.21 production. The original prototypes were powered by Ha.5b's, but the 1,250-h.p. Ha.41 was later fitted. Production began in 1940 as the Type 100 Heavy Bomber, Model 1 (Ki.49-I "Helen"). It was underpowered and after one hundred and twenty-nine were completed it was modified to mount two 1,450-h.p. Ha.109 radials and production continued as the Model 2 (Ki.49-IIa and Ki.49-IIb). Six experimental Model 3s (Ki.49-III) were also built powered by 2,500-h.p. Ha.117 radials. The Type 100 was never particularly successful and was operationally used on numerous duties other than bombing. A number of Model 1s had search gear installed and were used on submarine patrol operations. Model 2s were used as troop transports, and some were modified as heavy fighters and operated as "fighter-team pairs". One aircraft mounted a 75-mm. cannon and the other a searchlight, operating as a hunter-killer team. Three modified Model 2s were built as escort fighters and designated Ki.58. Armament was five 20-mm. cannon and three 12.7-mm. guns. In 1941 two Model 3s were converted to Ki.80 Multi-seat Fighters to be used as formation lead planes by group commanders. Neither the Ki.58 or Ki.80 entered service.

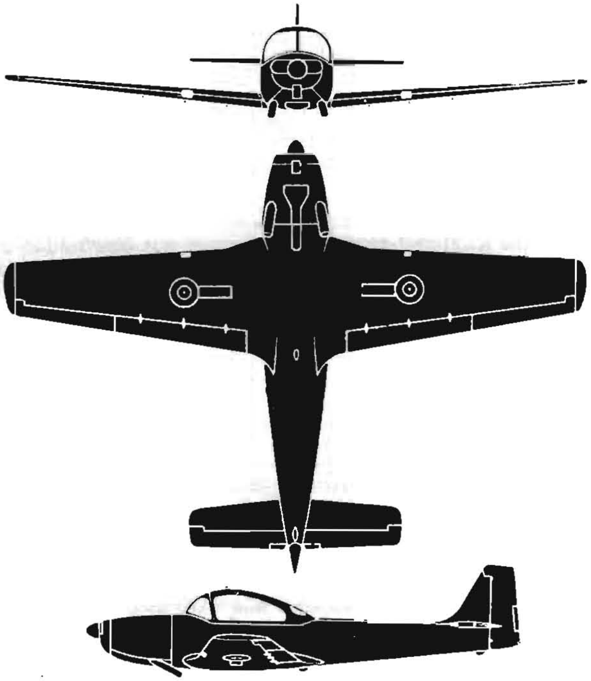
Bomber projects not completed were the Ki.68, an Army version of the J.N.A.F. G5N1, the Ki.82 and the private venture, Project Z Heavy Bomber, designed for operations against the American mainland. In April 1943 a project committee was formed to design a six-engined, long-range bomber as the Nakajima Project Z. A large mid-wing monoplane, power was to be supplied by six Ha.505 36-cylinder radials of 5,000 h.p. each. These units were to be composed of two Ha.219 radials mounted in tandem. In the fall of 1943 the Army and Navy initiated their joint *Fugaku* (Mt. Fuji) heavy bomber project and incorporated many of the Project Z design features. Nakajima was assigned production of the *Fugaku* and wind-tunnel research was conducted by the Army First Technical Research Institute. The design was nearly complete at the war's end.

Nakajima transport types were actively used by the J.A.A.F. Prior to the war the firm produced the Fokker *Super-Universal* in transport, ambulance and trainer models. Later the civil AT-2 transport, a scaled-down version of the DC-2, was built as the Type 97 Transport (Ki.34 "Thora") and a number were also supplied to the J.N.A.F. The Ki.41 High Speed Transport was projected but not built.

Last J.A.A.F. aircraft to enter production, the Ki.115a *Tsurugi* (Sabre) Special Attack Plane was designed for suicide missions against Allied shipping. Of simple construction, the landing gear was built up of welded steel pipe and dropped after take-off. Power was the Ha.115 radial. One hundred and four were built between March and August 1945, and two were delivered to Showa Airplane Co. for conversion to *Toka* (Wistaria Flowers) prototypes for the J.N.A.F. Built primarily of steel and non-critical material an all-wood Ki.115b model was also projected. A 1,100-lb. bomb was carried and could be released by the pilot in hopes of scoring a hit with both bomb and plane. The Ki.115a was noted for its poor flying characteristics and constant danger of side-slip or spin. A Ki.230 Special Attack Plane was also projected but the design was not completed.

(To be concluded)

PIAGGIO P-149-1



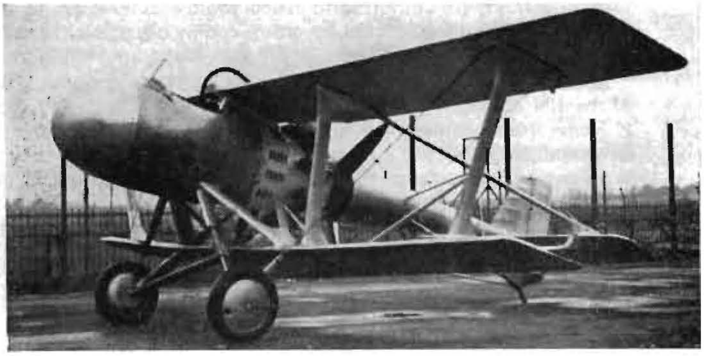
The Piaggio P-149 flew for the first time in July 1953. It is a civilian development of the P-148 two/three-seat trainer built for the Italian Air Force. Indeed, many parts of the two aircraft, including the wings and the horizontal tail unit, are completely interchangeable. The P-149, however, has been given a bigger cockpit cover, as the cabin has been redesigned to take four people. It has a retractable tricycle undercarriage instead of the fixed unit of the P-148.

Salient features: The machine is of all-metal construction; the wings are fully cantilever, of light alloy with slotted flaps and ailerons, and contain the fuel tanks, holding 52.8 gallons. The fuselage is an oval-section monocoque; the tail unit is constructed in similar fashion to the wings. The retractable undercarriage is electrically operated, the main wheels folding outwards and the nose wheel backwards. The engine is a horizontally opposed flat six. The four-seater cabin is arranged for dual control, with full blind-flying, navigational and radio equipment, and there is a roomy luggage locker at the rear of the seats. The cockpit cover slides to the rear.

Data: Manufacturer: Piaggio & C., Società per Azioni, Genoa. Power plant: one 260-h.p. Lycoming GO-435-C2, driving a Piaggio P.1031 three-bladed airscrew, with constant-speed gear. Accommodation: four. Dimensions: span 36 ft. 6 in.; length 27 ft. 11 in.; height 9 ft. 4 in. Weights: empty 2,447 lb.; loaded 3,637 lb.; disposable 1,190 lb. Performance: maximum speed 175 m.p.h. at sea-level, 196 m.p.h. at 6,500 ft.; cruise at 155 m.p.h. at 6,500 ft.; rate of climb 980 ft./min.; service ceiling 17,000 ft.; range 660 miles.

(*Photo: D. F. Gilpin, Germany.*)

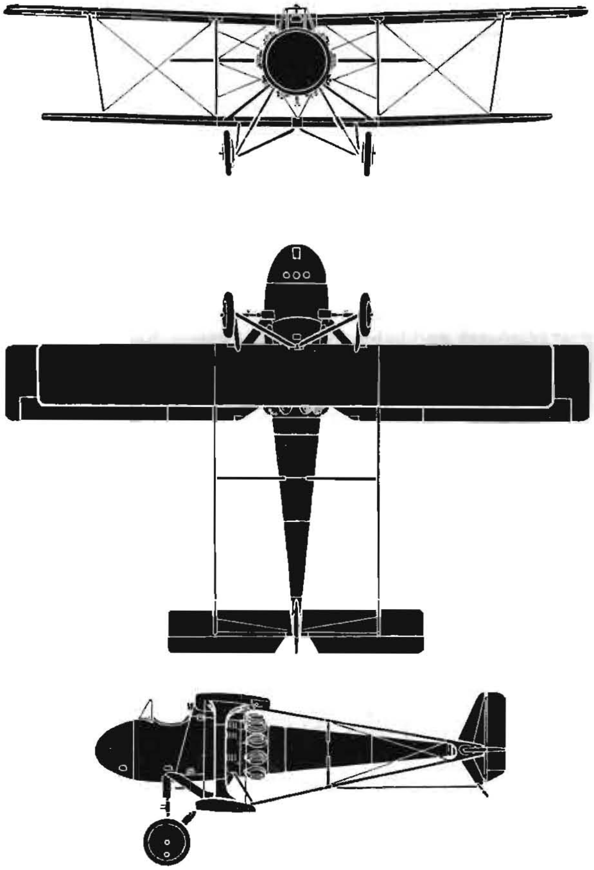
VICKERS TYPE 161/162

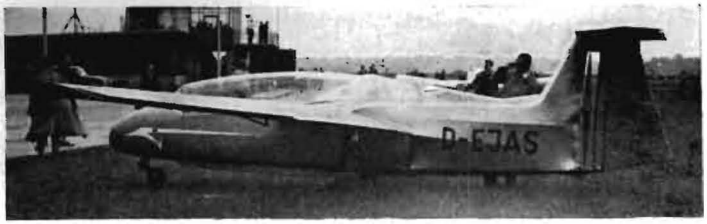


In 1927 the Air Ministry issued a specification (F.29/27) for a single-seat fighter to be equipped with a 37-mm. quick-firing gun developed by the Coventry Ordnance Works. Two manufacturers received orders for prototypes to this specification. Westland built one machine (J.9565) which was a modified version of the wire-braced low-wing monoplane they had produced earlier to meet a more conventional single-seater fighter requirement (F.20/27). Vickers produced the unconventional Type 161.

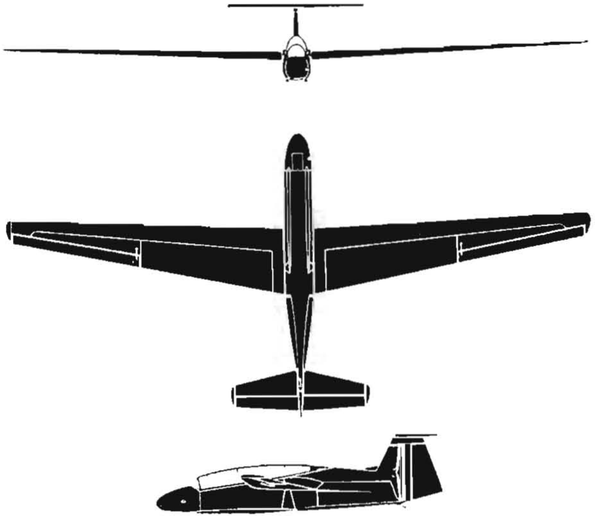
The design of the Vickers 161 was unusual. The radial engine was mounted at the rear of the nacelle containing the pilot and armament, which was itself slung against the under-surface of the upper of the two-bay biplane wings. The tail unit was mounted on a long, tapering, cylindrical rear fuselage fixed to a bearing on the rear face of the hub of the four-bladed propeller and was braced to the wing cell by tubular metal booms.

Like the Westland C.O.W. gun fighter, the Vickers 161 is believed to have been designed originally to take the British Mercury III radial of 485 h.p., but the prototype (J.9566) was actually built with the earlier Bristol Jupiter engine. It made its first flight from Brooklands in 1931, flown by Capt. J. ("Mutt") Summers, and immediately revealed a lack of directional stability. As a result, the prototype was modified and fitted with a much enlarged fin and rudder and fan-shaped fins extending rearwards from the ends of the tail booms. This modified design is believed to have been designated Type 162. However, the C.O.W. fighter requirement was not proceeded with and the Vickers F.29/27 was not developed further.





FISCHER RW-3



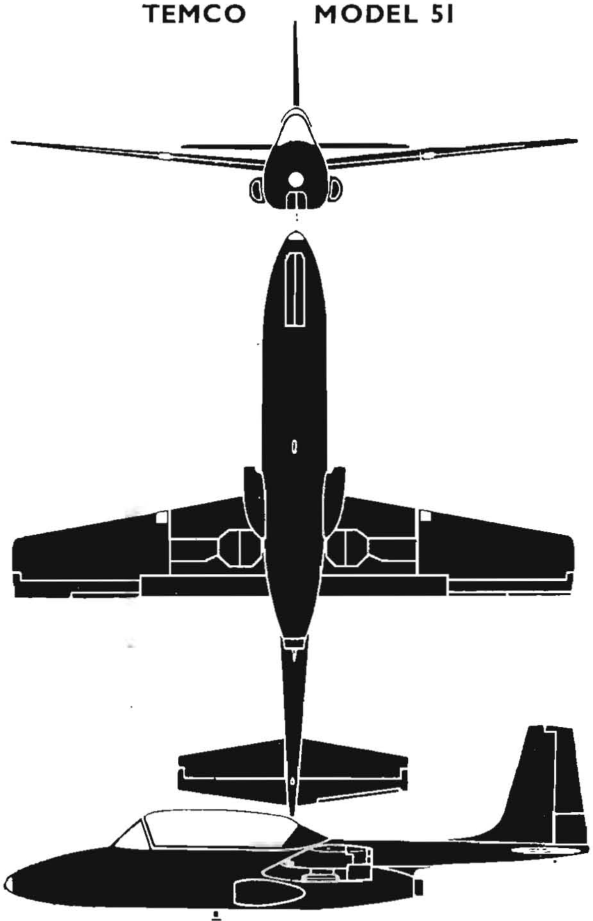
In Western Germany, the past few years have produced a number of original light and ultra-light prototypes. Those which have reached the flight trials stage include the Heini Dittmar HD-153 Motor-Möve (developed from the HD-53 Segel-Möve sailplane), the Fritz Raab-designed and Puetzer-built Moraa and the Scheibe SF-23 Sperling two-seaters, plus the powered-gliders, the Burglengenfeld-built Me 06 Motor-Segler and the DKW pusher-powered, high-wing FIBO 2a. The last-mentioned is a 1951 design, with tandem main wheels.

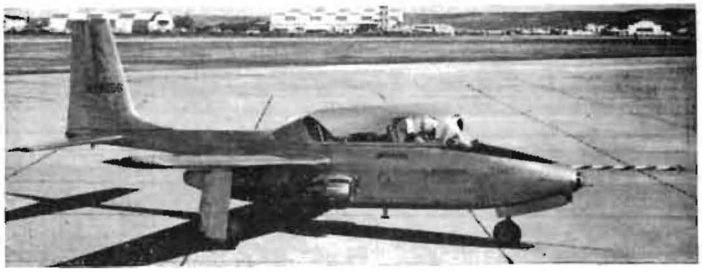
The Fischer RW-3 is thus the second post-war German light aircraft to employ pusher power. The RW-3 is essentially a powered glider of mixed wood and metal construction, with fabric covering. Three versions are envisaged, the prototype A-1, for development as a motorised sailplane; the A-2 as a club primary trainer and the A-3 as a shorter span, advanced and aerobatic trainer.

Salient features: Of pleasant overall aspect, the RW-3 possesses several uncommon design features. The cantilever mid-wing is swept forward to improve low-speed characteristics, while the Tee-shaped tail assembly acts as the mounting for the propeller which is driven by the engine sited in the rear fuselage. The main wheels are retracted manually as is the semi-retractable nose wheel. First prototype wrecked in June, second is now flying.

Data: RW-3 A-1, A-2 and A-3. Seating: two in tandem. Power: RW-3 A-1, 40-h.p. Nelson or 55-h.p. Porsche; A-2, 55-h.p. or 75-h.p. Porsche; A-3, 75-h.p. Porsche. Dimensions: A-1 and A-2 (A-3), span 48 ft. 6½ in. (32 ft. 9½ in.); length 23 ft. 11½ in.; wing area 188.4 sq. ft. (154 sq. ft.); aspect ratio 15.4 (7.0). Weights: empty 795 lb.; loaded 1,235 lb. Performance: max. speed 103 m.p.h. (146 m.p.h.); cruising 90 m.p.h. (124 m.p.h.); best gliding angle 22 ; minimum sinking speed 2.95 ft./sec. (3.61 ft./sec.). Photo- Cost, f.a.f., from 16,000 DM. (£1,365) to 19,000 DM. (£1,620). graph shows RW-3 A-1 first prototype, D-EJAS, at the "Flugtag der Nationen", Cologne air display, 3rd June 1956. (*Photo: D. F. Gilpin, Germany.*)

TEMCO MODEL 51





In spite of their expressed intention to leave the light trainer field after the non-success of the Plebe, Temco have lost little time in building prototype piston and jet trainers. Evidently the company do not intend Beech to have the market to themselves. Intended to appeal to the commercial and military market both at home and abroad, the Temco 51 prototype, N78856, began flight testing recently. It is entirely a private venture by the company, like the Model 58.

Salient features: Pilot and pupil are seated in tandem in a short fuselage, with a large moulded canopy. The size of this cockpit cover, and the one-piece moulded windscreen, together with its placing forward of the mid wing, must give exceptional visibility. Aft of the cockpit is mounted the jet engine, with small ear intakes, and the simple tail unit is carried above the jet outlet on a short boom. The undercarriage consists of inwards-retracting, wide-track main wheels and a forward retracting nose-wheel. Construction is all metal, and provision is made for night-flying equipment.

Data: Manufacturer: Temco Aircraft Corporation, Dallas, Texas. Powerplant: one Continental YJ-69-T-9 turbojet giving 920-lb. static thrust. Accommodation: pilot and pupil. Dimensions: span 29 ft. 9 in.; length 30 ft. 7 in.; wing area 150 sq. ft. Weights: normal gross 4,137 lb. Performance: maximum speed 285 kts. at sea-level, 300 kts. at 15,000 ft. Maximum rate of climb 1,900 ft./min. Service ceiling 35,000 ft.

BIOGRAPHY · TEST FLYING · FICTION

New Books

AIRPORT GUIDE · SPACE TRAVEL · IDENTIFICATION

"The Proving Flight", *by Captain David Beaty (Secker & Warburg, 14s.).*

IN his novel *The Proving Flight*, Captain David Beaty has shown that he possesses, at all events, what most people believe the first requirement of a novelist, the capacity to spin a good narrative. This story of the voyage of a new airliner and the sudden development of a mysterious and vital fault makes absorbing reading. The tension is well maintained and the denouement is thrilling. Captain Beaty, who is a former senior B.O.A.C. pilot, gives his book a technical background which is, incidentally, of considerable interest. His weak point is characterisation. His airline chairman and senior pilot are stuffed dummies, and we hope this is the last airline story introducing captain and stewardess romances. In this instance, as in most, they are tiresome and unnecessary. Captain Beaty's story would have gained in strength and tension had there been no woman in it at all.

"Pioneer Airmen", *by Laurie Cade (7s. 6d.),* **"Famous Airports of the World"**, *by John Stroud (8s. 6d.), and* **"Famous Air Routes of the World"**, *by Harold Champion (8s. 6d.), all published by Frederick Muller.*

PIONEER Airmen, Famous Airports of the World and *Famous Air Routes of the World* are three modest books which will give the newcomer to aviation a useful potted account of the subjects they cover. They may well have value in arousing in young people that initial interest in aviation which should be developed at an early age if we are to become an air-minded nation.

"Alpine Pilot", *by Hermann Geiger (Cassell, 10s. 6d.).*

FROM time to time there appears in the newspapers stories of rescues of people stranded in the high Alps carried out by aeroplane. In nine cases out of ten the pilot is Hermann Geiger, who with remarkable skill and courage has developed a technique of flying and landing in the Alpine wilderness of icy mountains which is all his own. Some of his landings and take-offs have been performed under what would normally be regarded as impossible conditions and his story is fascinating in the extreme. Anyone who has ever piloted an aeroplane will marvel at what Geiger has accomplished.

"Lorraine Squadron", *by Paul Lambermont (Cassell & Co. Ltd., 13s. 6d.).*

ONE of the more remarkable of the "odd" units which materialised in the last war was the Lorraine Squadron, composed of Frenchmen not only from France but from all over the world. It had its birth at Fort Lamy in Equatorial Africa, where a party of French pilots refused to accept their country's surrender and formed a squadron banner of the Cross of Lorraine. They served in the Sudan, Abyssinia, Cyrenaica and finally in England, where they joined in the bombardment of the V1 launching sites and finally the invasion of France.

Few books have been written on the part played by the light/medium bombers in the Second World War, and the Allies in navy-blue who operated from Hartford Bridge deserve to be served by a volume such as this. Few of the illustrations have been seen before, and the Gallic description of operations gives a new slant to the increasing library of war in the air.

"Vapour Trails", *edited by Mike Lithgow (Allan Wingate, 13s. 6d.).*

ANYONE picking up *Vapour Trails* and seeing the name of Mike Lithgow on the cover would be justified in thinking that this is a new book by the famous Vickers-Armstrong test pilot. In that respect he would be misled, because Commander Lithgow is the editor of a series of personal stories by famous test pilots. It makes first-class reading for the aviation enthusiast and bristles with anecdotes of famous and long-forgotten aircraft. Many of these are important construction to aviation history.

"South to the Sun", *by Betty Beaty (Mills & Boon, 10s. 6d.).*

SOUTH to the Sun is a novelette written round accidents in the life of an air stewardess and the inevitable (in novelettes of this kind) affairs of the heart with male members of the crew. Even though it is quite a good novelette of its kind it is to be hoped that it is the last of its kind, and that Betty Beaty will turn her talent for story telling in a more worthy direction.

"The Airport Visitor and Air Traveller", 1956 *Edition. Edited by Charles W. Cain and M. J. Hardy (Penman Enterprises, Ltd., 2s. 6d.).*

THIS year's edition of an already familiar annual is greatly improved, with considerably more information contained in its 72 pages. There are descriptions of sixty different types of transport aircraft and helicopters, and an innovation this year is that every one of these types is illustrated by a photograph. Another point that will appeal to the layman as well as to the knowledgeable enthusiast is the half-page entitled "How To Use This Book", by means of which the newly-fledged aerophile can get his or her money's worth from this annual.

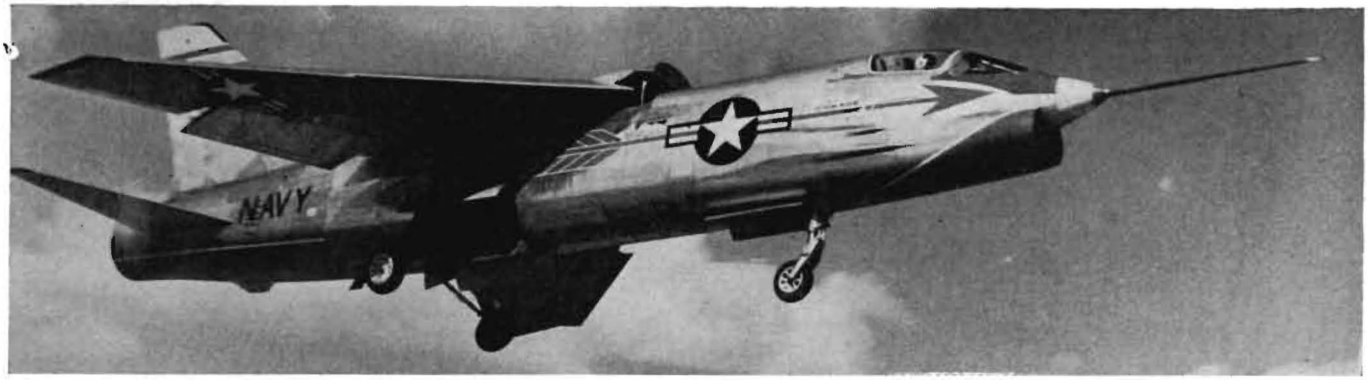
The 1956 edition is agreeably up-to-date; such recent variants as the Model 707-440 Stratoliner, the CW-20T Commando and the SA-16B Albatross are listed, and a feature of the list of civil registration letters is that those countries using numbers after the nationality marks are indicated by an asterisk. The only criticisms are that space prevented the inclusion of names of individual aircraft in the Aircraft Logbook; also, lists of airline fares and currency exchange rates seem unnecessary in a book of this kind, since they can be found in airline timetables.

"Swastika in the Air": *The Struggle and Defeat of the German Air Force,* 1939–1945, *by Karl Bartz (William Kimber, 18s.).*

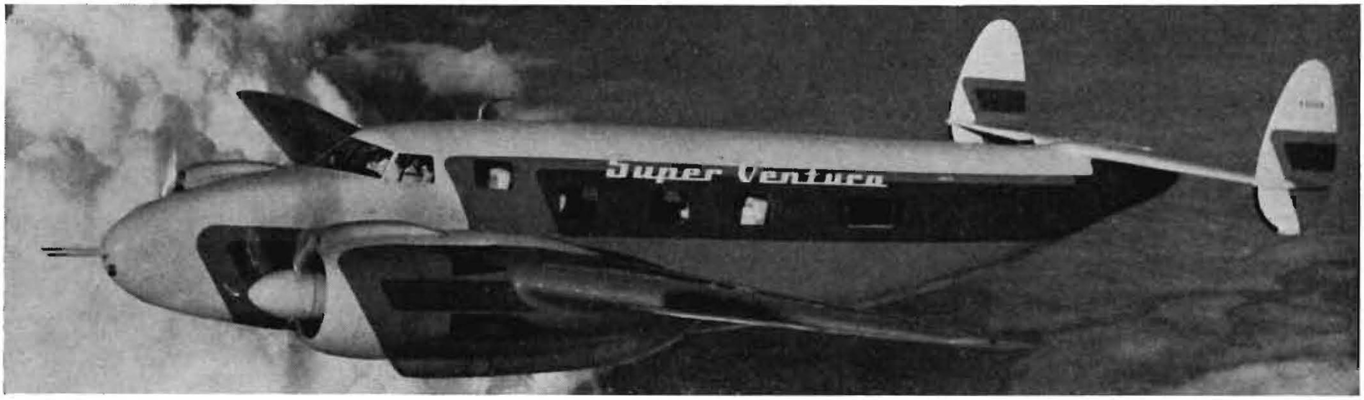
THIS is a longer and more studious work than some of those that have appeared since the war dealing with the same subject. It contains many facts and figures gleaned from German sources, and therefore interesting and speculative comparisons may be made by reference to the semi-official histories of the Royal Air Force and United States Air Forces.

Most German air books lay the blame for the defeat not upon the efforts of the Allied Air Forces, but on the shoulders of "misguided" persons such as Hitler and Goering, and in this respect this book is no different. There are, however, new portraits of Udet and many other Germans whose names are barely mentioned in contemporary writings, including Kammhuber of the night-fighters and Bachem of "Natter" fame. Once again we are given a list of victories scored which reads like a comptometer on holiday; on one page five men share 371 "kills" at night alone, but a ray of light is cast upon the scene by the revelation that "more than once German pilots found themselves fighting each other".

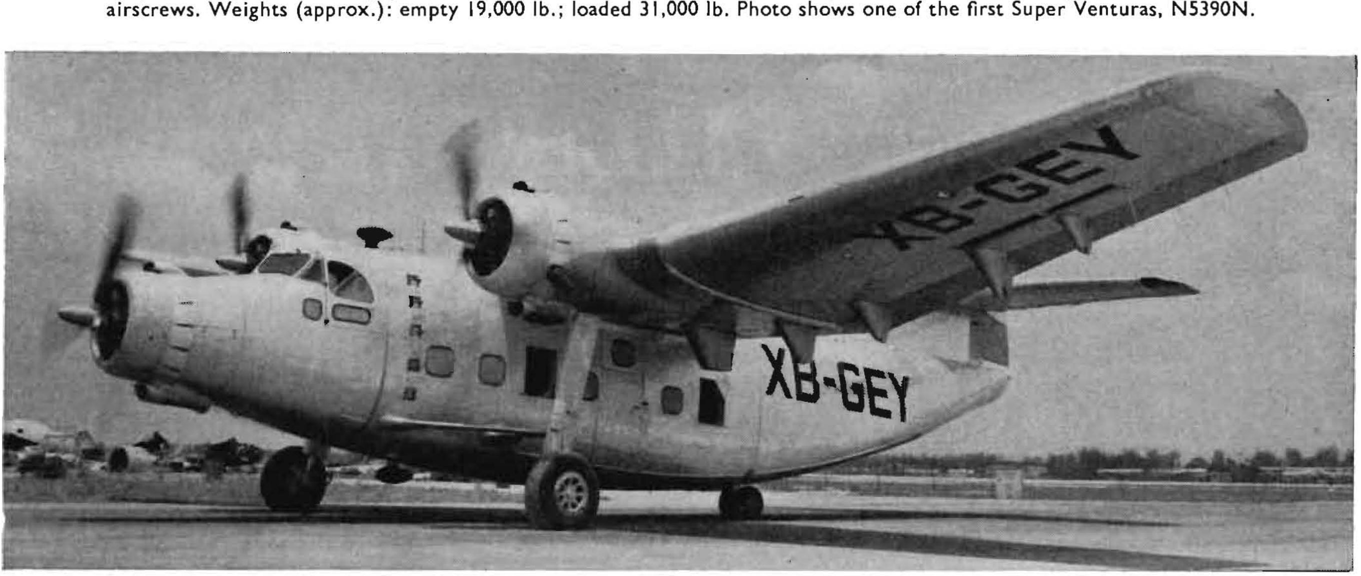
Bartz is of the opinion that VE-Day could have been coincidental with D-Day if we had paralysed the ball-bearing industry, and attacked the railways in 1943. The purist will point out that the Mosquitoes which bombed Berlin early on were not fighter versions, but more interesting is the comment that they could not be picked up by radar as they were made of wood! Hitler was perturbed by the raids of B-29 Superfortresses in groups of forty machines, but the author is on safer ground with his descriptions of the last German developments of new machines. The part taken by the Luftwaffe at Stalingrad, or rather the lack of the Luftwaffe at that turning-point, is vividly portrayed, for it was in the dreary, snow-swept wastes of Russia that the air force lost its best crews. The aircraft losses of Britain, America, and Germany are quoted as 22,010, 18,369, and 70,604 respectively, counting fighters and bombers only; this is only a fragment of the information contained in the pages of what must be regarded as an important book and a valuable contribution to historical records, especially in view of the analysis of the reasons for the failure of the Luftwaffe to accomplish what it was designed for – a weapon of offence, and never for defence. It is easy to read, but reference should be made to other published works giving other viewpoints and data and correct designations of German and other aircraft.



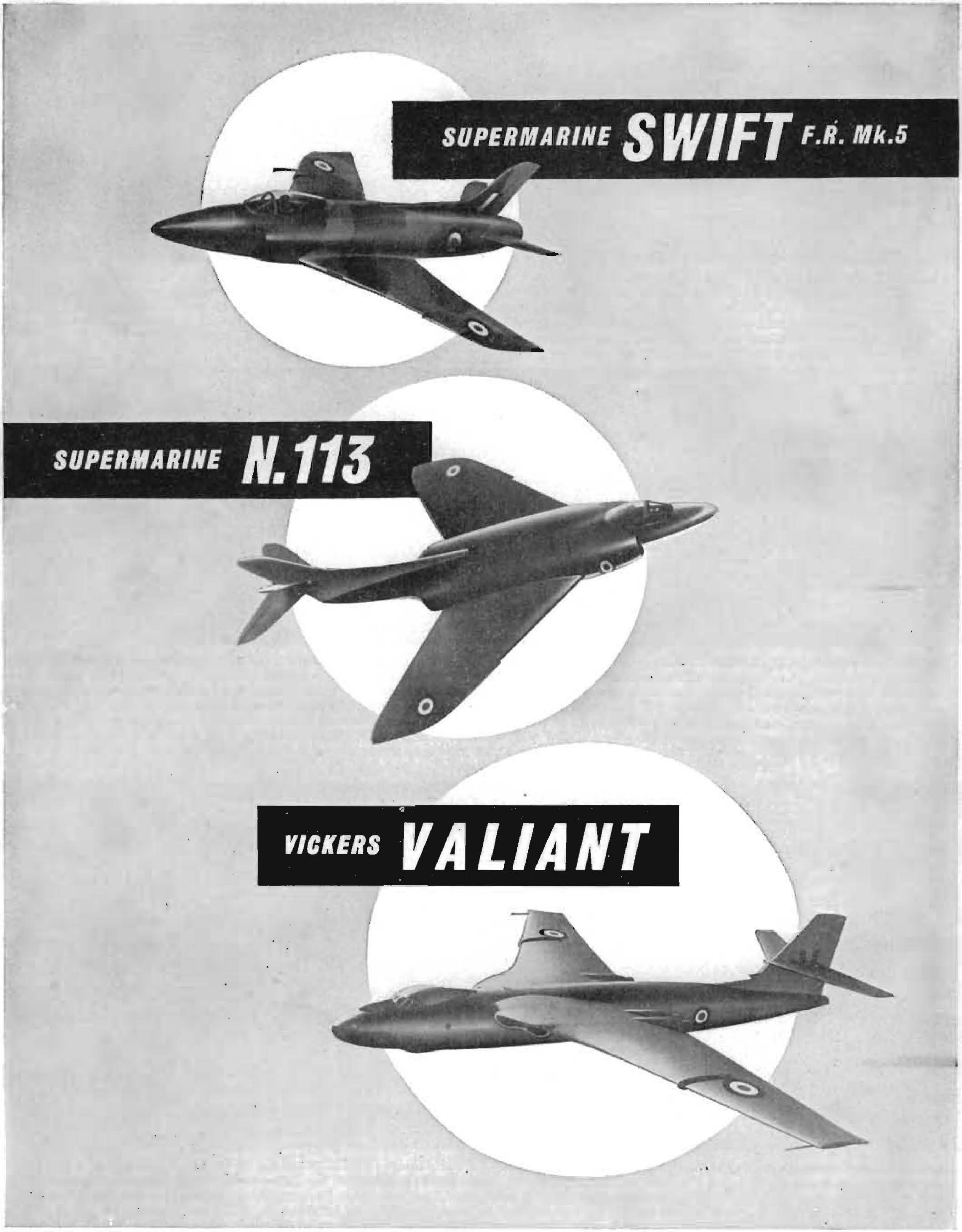
CHANCE VOUGHT F8U-1 CRUSADER—Clearly shown for the first time is the two-position incidence wing which permits the Crusader to operate effectively over a very wide speed range. The Crusader is the first production aircraft to employ this device. Two-position incidence has several advantages including (*a*) virtual horizontal attitude for the fuselage for take-off and landing while the wing is at a high angle of attack; and (*b*) adoption of short undercarriage. As the photo reveals, the wing is hinged at the rear and works in conjunction with the slab tailplane and the "droop snoot" wing leading edge. (*Photo via: Hal. G. Martin, Florida, U.S.A.*)



HOWARD AERO SUPER VENTURA—Howard Aero Inc. of San Antonio International Airport, Texas, is doing for the Lockheed-Vega 37 Ventura bomber what Lear Inc. of Santa Monica, California, has done for its civilian counterpart, the Lockheed Model 18 Lodestar. Externally, the immediately obvious changes in shape of the Super Ventura include the "solid" nose; more rakish cockpit windscreen; reshaped nacelles with spinners; "king-size" picture windows; revised tail assembly and deeper rear fuselage—the former ventral gun position "kink" having been smoothed out. For the same fuel expended, the Super Ventura will carry nearly twice the useful load of a DC-3 at 50 per cent greater cruising speed. Engines: 2,400-h.p. P. & W. Double Wasp R-2800-C radials driving three-or special four-blade airscrews. Weights (approx.): empty 19,000 lb.; loaded 31,000 lb. Photo shows one of the first Super Venturas, N5390N.



MEXICAN-OWNED NORTHROP YC-125A-NO RAIDER—All the Raiders (YC-125As and Bs) of Tactical Air Command, U.S.A.F. were declared surplus in 1955 and the bulk were purchased by Frank Ambrose Aviation Co., Miami, Fla. Frank Ambrose Aviation are selling or leasing these tri-motors to operators requiring a rugged, general-purpose cargo hauler capable of using unprepared strips. The original 1,200-h.p. Wright Cyclone 9 R-1820-99s may be replaced (as with XB-GEY) by 1,350-h.p. R-1820-56As, boosting the a.u.w. from 40,000 lb. to 43,000 lb. Empty weight 25,000 lb. Speeds: max. 201 m.p.h., cruise 165 m.p.h., stall 69 m.p.h. Range 1,800 miles. Bucket-seat conversion thirty to forty passengers with rear loading, power-operated ramp drive-in for trucks and bulldozers. For ploughed field operations twin mainwheels may be fitted, or skis for snow/ice. Span 86 ft. 6 in.; length 67 ft. 1 in. (*Photo: Hal. G. Martin, Miami, Fla., U.S.A.*)

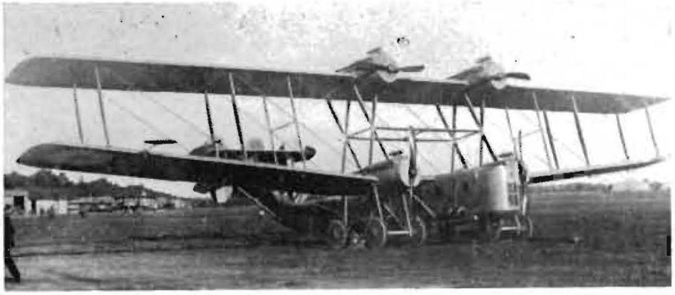


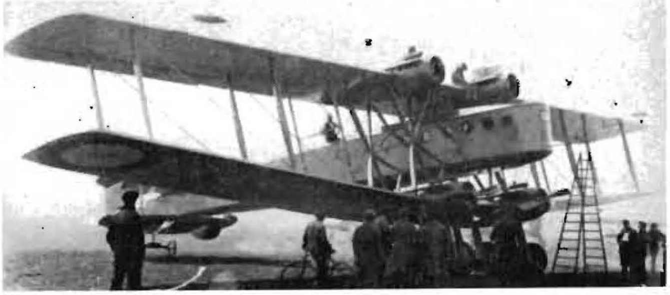
SUPERMARINE SWIFT F.R. Mk.5
SUPERMARINE N.113
VICKERS VALIANT

VICKERS-ARMSTRONGS (AIRCRAFT) LIMITED WEYBRIDGE SURREY

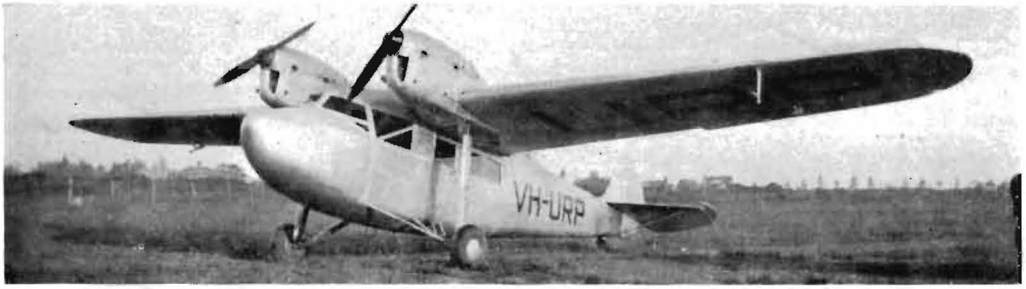
TGA AT444A

PHOTOS BY REQUEST

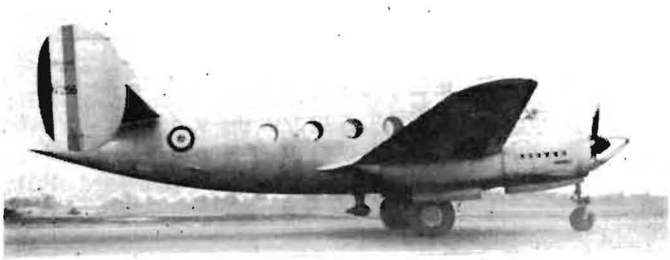




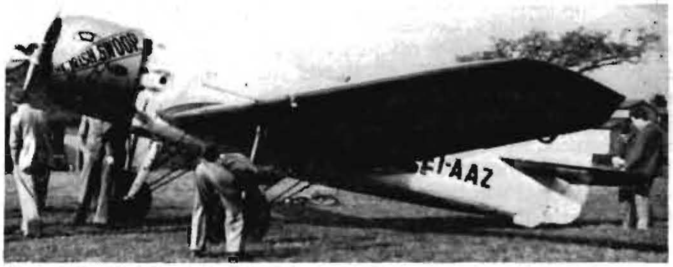
SO MUCH OF EVERYTHING. Two variations on a four-engined bomber theme are provided by the 1919 Blériot types 73 (*left*) and 74 (*right*), both of which were called the Mammouth (Mammoth). Apart from their impressive size and weight—span 98 ft. 6 in., loaded 28,000 lb.—the Mammouths were notable for their incredible complexity of strut arrangement. An ultra-modern touch is the load-spreading bogie main undercarriage. Both the 73 and the 74 were powered by four 300-h.p. Hispano-Suizas which permitted a maximum speed of approximately 83 m.p.h. Duration was 5 hours. The length was 72 ft. 2 in. and wing area 4,066 sq. ft. Type 75 was a transport development.



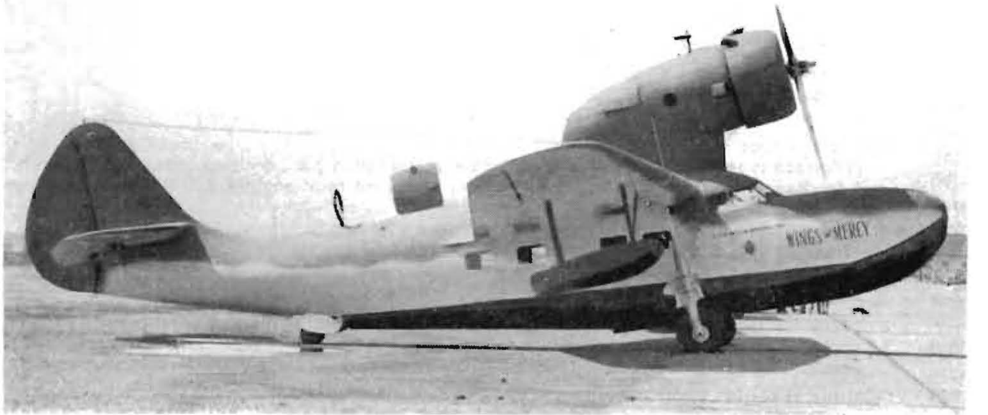
RECOGNITION TEASER—Not the Tugan Gannet but the equally rarely-illustrated Wackett Codock of April 1934, built by the short-lived **Co**ckatoo Island **Dock**yard & Engineering Co., Pty. W/Cdr. L. J. Wackett is better known for his wartime Boomerang fighter and primary Wackett Trainer. Intended as a five-seat light transport, the Codock prototype, VH-URP was powered by two 150-h.p. Napier Javelin inlines. The design was not proceeded with and W/Cdr. Wackett left to join Tugan Aircraft/General Aircraft, Pty., Ltd., where he produced the twin Gipsy Six-powered Gannet. (*Photo: Harold G. Martin archives.*)



STAR PERFORMER—In the Christian-Jaques air-sea drama "Race for Life" the aircraft which has puzzled some readers is a Dassault M.D.315 Flamant (Flamingo) specially painted in Royal Norwegian Air Force colours. A total of 318 Flamants has been built since 1947; the three types being the M.D.311 aircrew trainer, the M.D.312 and the M.D.315 general-purpose transports seating six. Illustrated is a French Air Force M.D.311. (*Photo: BR/SPB, France.*)

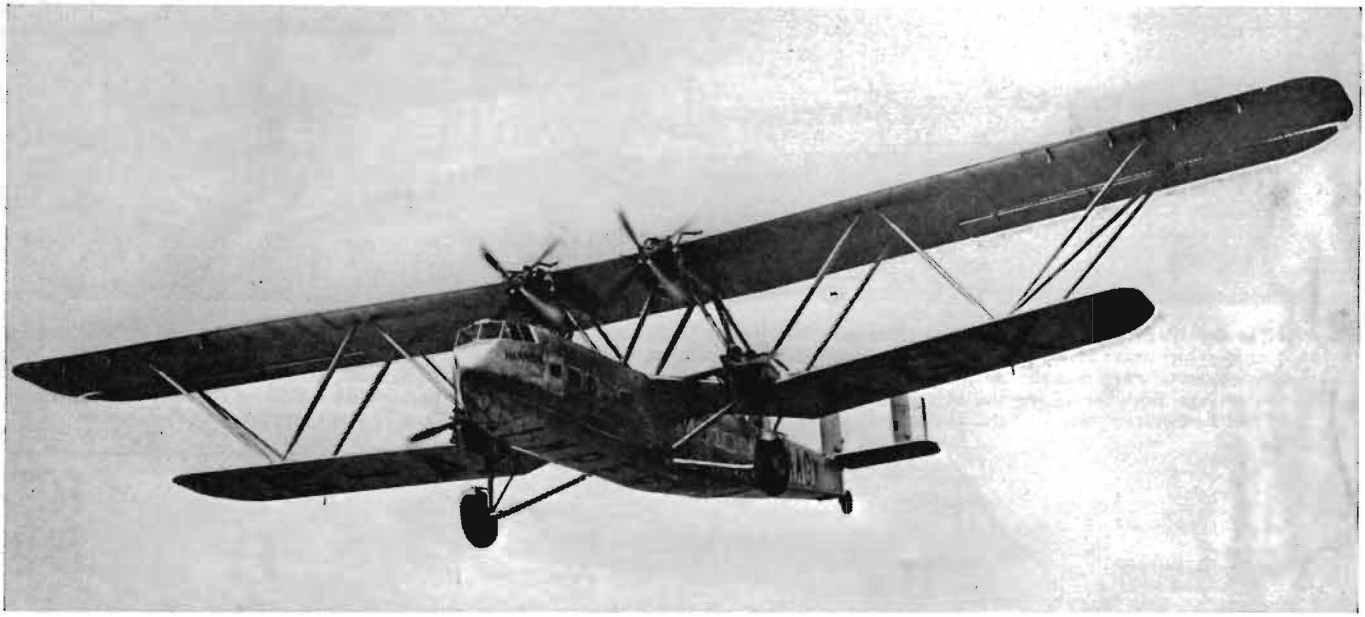


THE 1934 IRISH SWOOP—Painted cream and green, with the racing number 29 and Eire registration EI-AAZ, the "one-off" Bellanca Model 28-70 Swoop was a non-starter in the England-Australia air race—see M. J. Hardy's letter in the May issue. Shipped back to New York and repaired, the Swoop (c/n. 901) was flown back to the factory and cracked-up on landing. It was rebuilt and became Mollison's "*Dorothy*" G-AEPC *after* his Atlantic flight.



R.A.F.'s MYSTERY CLIPPER

Better known by its P.A.A. (China) name of F-91 Baby Clipper, the Fairchild XA-942A of 1934 was an all-metal eight-seat amphibian powered by either a Wright Cyclone or (in this case) an 800-h.p. P. & W. Hornet S3E-G radial. Hal G. Martin, who took this unique photo, has been able to fill in some of the missing detail of the R.A.F.'s sole XA-942A. Painted green and white, ex-NC15952 was purchased by the British American Ambulance Corps and named "Wings of Mercy"—and was originally intended for Channel Spitfire rescues. Max. speed 215 m.p.h., cruise 167 m.p.h.; a.u.w. 9,700 lb.; span 56 ft.; length 47 ft. P.A.A. never took delivery of the (3rd) Baby Clipper.



1/144th Scale Plan of the H.P. 42

THE Handley Page H.P.42 prototype, "Hannibal"—G-AAGX—flew for the first time on Monday, 17th November 1930 and was piloted by Squadron Leader A. England and Major J. Cordes. After a number of short hops the huge machine took off at 1 p.m. for a proper flight. It was the world's first four-engined aeroplane designed specifically as an airliner and was very advanced for its day.

Designed to the order of Imperial Airways the H.P.42 was built in two versions; the Eastern with accommodation for eighteen passengers in two cabins, was for operations in semi-tropical conditions on the long mail routes between Karachi, Cairo and Kisumu on the shores of Lake Victoria, and the Western, thirty-eight passengers, for the London/Continental service. Apart from interior arrangements they were identical in every respect. Eight machines were built; each of them registered 12,000 hours and their aggregate mileage was over the ten-million mark. The forward cabin, which was placed ahead of the wings, provided an excellent view for passengers.

Structurally the "42" was an all-metal machine (except for the wing covering and the covering of the rear fuselage) mainly of duralumin, and stainless steel was used for highly-stressed members. The upper wing with an area of 1,999 sq. ft., was fitted with automatic slots. The lower wing had an area of 990 sq. ft. The engine and brake controls were centrally placed, and normal practice on take-off was for one pilot to operate the engine controls and brakes, while the other handled the take-off.

Flying was more leisurely in 1931 and passengers on the London-Paris route were served a four-course hot lunch or seven course dinner in luxurious surroundings. Liquid refreshment was served from a trolley by a steward.

When World War II commenced five of the machines were transferred as active-service transport to the R.A.F. after serving for nine years with Imperial Airways. The record and eventual fate of the eight H.P.42s is as follows:

Western Type—H.P.42W

G-AAGX "Hannibal" (prototype)—Completed October 1930. Slightly damaged in a forced landing at Tudeley, nr. Tonbridge on 8th August 1931; lost in Persian Gulf on flight to Jask, 1st March 1940.

G-AAUC "Horsa"—Completed 1931; impressed into the R.A.F. in 1940 and subsequently broken up.

G-AAUD "Hanno"—Completed 1931; impressed into the R.A.F.; blown over by gale and destroyed, 19/3/40.

G-AAUE "Hadrian"—Completed 1931; impressed into the R.A.F. and based at Odiham, 1940. Serial No. AS982.

Eastern Type—H.P. 42E

G-AAXC "Heracles"—Completed 1931; impressed into the R.A.F.; blown over by a gale and destroyed.

G-AAXD "Horatius"—Completed 1931; wrecked in forced landing at Tiverton on 7th November 1939.

G-AAXE "Hengist"—Completed 1931; destroyed in hangar fire at Karachi on 31st May 1937.

G-AAXF "Helena"—Completed 1931; impressed into the R.A.F. and dismantled at Donibristle late in 1940.

Principal characteristics

Span: 130 ft.; length 89 ft. 9 in.; height 27 ft.

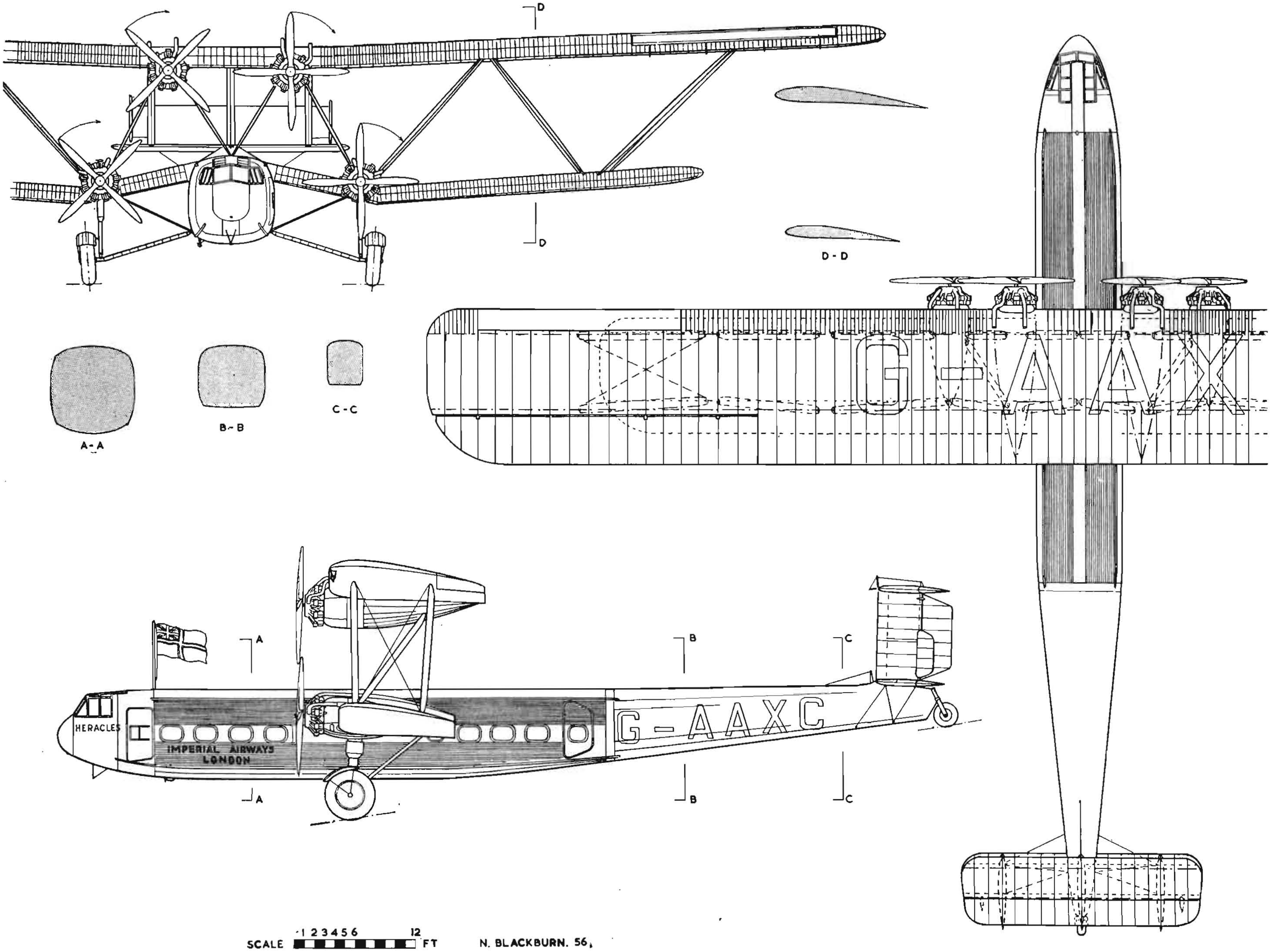
Engines: Four Bristol Jupiter XFBMs or XIs of 550 h.p.

Weights:
(Western type) payload 8,500 lb., a.u.w. 28,000 lb.
(Eastern type) payload 7,000 lb., a.u.w. 28,000 lb.

Performance:
(Western type, Jupiter XFBM engines) max. speed 129 m.p.h.; cruising speed 95-105 m.p.h.; landing speed 51.5 m.p.h.; initial rate of climb on four engines 670 ft./min., on three engines 260 ft./min.
(Eastern type, Jupiter XI engines) max. speed 120 m.p.h.; cruising speed 95-105 m.p.h.; landing speed 50 m.p.h.; initial rate of climb on four engines 845 ft./min., on three engines 675 ft./min.

Accommodation:
(Western type) thirty-eight passengers in two cabins holding eighteen and twenty persons respectively.
(Eastern type) eighteen passengers in two cabins seating six and twelve persons respectively.

Colour scheme: Silver overall with black registration markings.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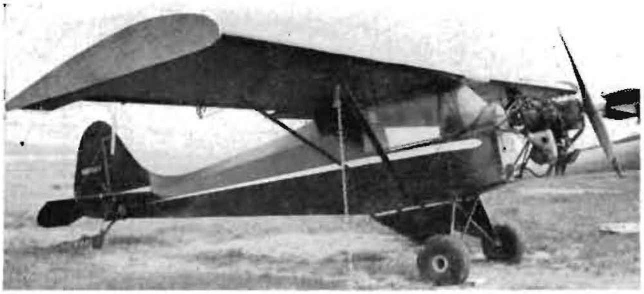
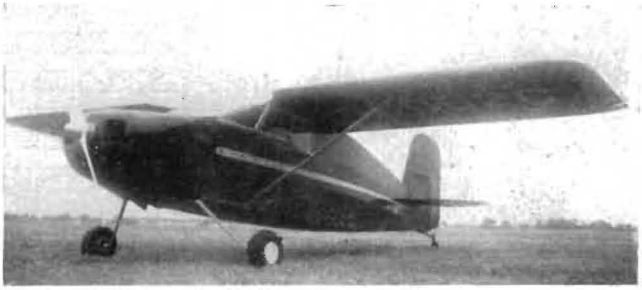
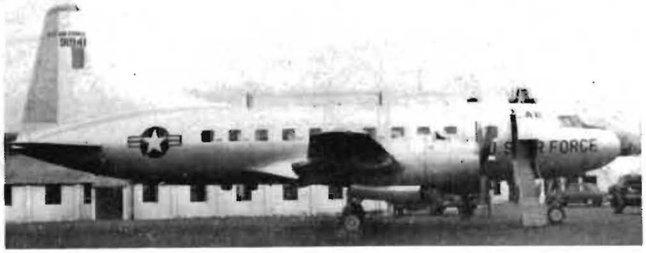


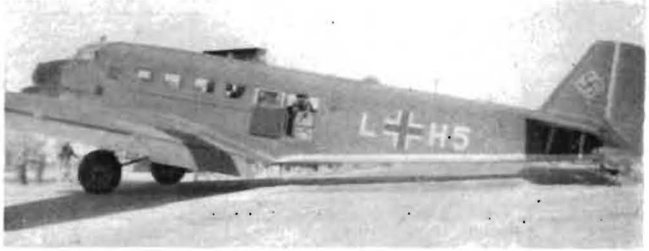
No Piper Cub but an original single-seater, the Kraemer LK-1 Rapid Rambler (N6002V-Exp'l) cruises at 95 m.p.h. on 65 h.p. Continental A-65-8. Span 24 ft. 6 in.; length 18 ft. 3 in. L. A. Kraemer of Rapid City, South Dakota, is owner-builder. (*Photo: Leo J. Kohn, Milwaukee 16, Wis., U.S.A.*)



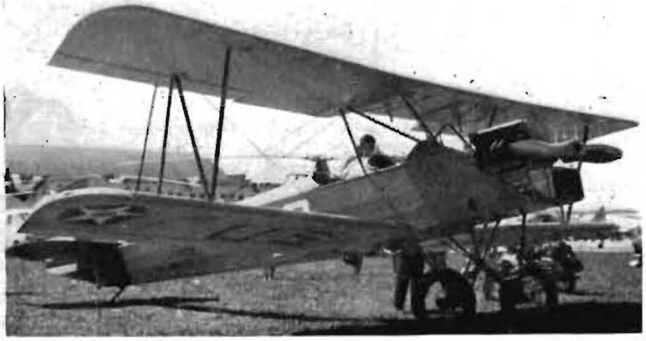
Latest Steve Wittman Tailwind (N9052C-Exp'l.) has a larger-area, redesigned fin and rudder. The single-rod landing gear is the latest development of the Wittman-patented oleo-leaf leg. The Tailwind is powered by a 115-h.p. Lycoming. (*Photo: Burton Kemp, Chicago 30, via "U.S. Flying News".*)



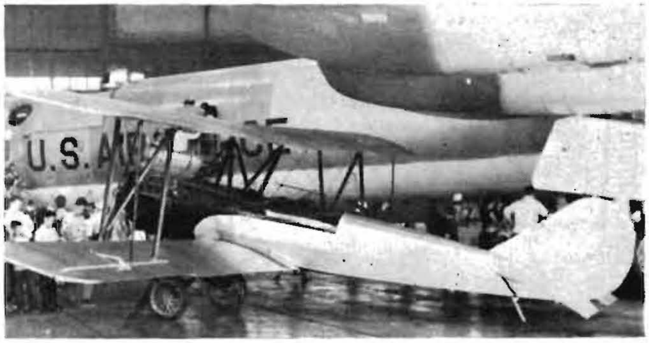
Only Convair T-29A resident in Europe is based at Sculthorpe, attached to the 47th Operations Squadron, U.S.A.F. The T-29A is a direct Convair 240 conversion with four dorsal astrodomes and built-in steps as shown in this photo of 49-1941-A (c/n. 203). The suffix "A" indicates "last three" serial duplication.



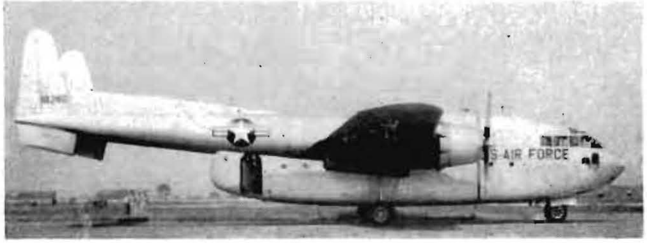
Seen at Stavanger's Sola airport recently, a realistically-painted *Luftwaffe* Junkers Ju 52/3M g7e. However, the starboard side retains the correct S.A.S./D.N.L. colours and registration LN-KAG. The reason? LN-KAG is taking part in a new Norwegian film called "Contact". (*Photo: K. Bremnes, Vaulen, Stavanger, Norway.*)

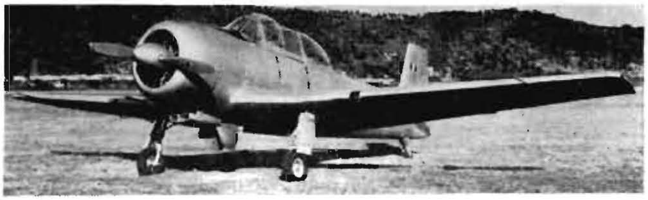


This 1925-designed Consolidated PT-1E (A.C.26-233) two-seat primary trainer is owned by Hollywood's Paul Mantz and has appeared in the film "One Man Mutiny". Engine is 180-h.p. Wright V-720.



Photographed at Ellsworth A.F.B. recently, a 1928, 100-h.p. OX-5-powered two seat, Alexander Eaglerock, rebuilt in 1954/55 by its current owner, Floyd Hesler. (*Photo: Merle Olmsted, Chicago 51, Ill., U.S.A.*)

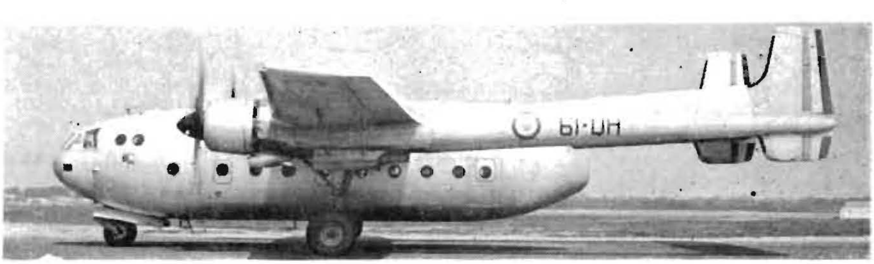




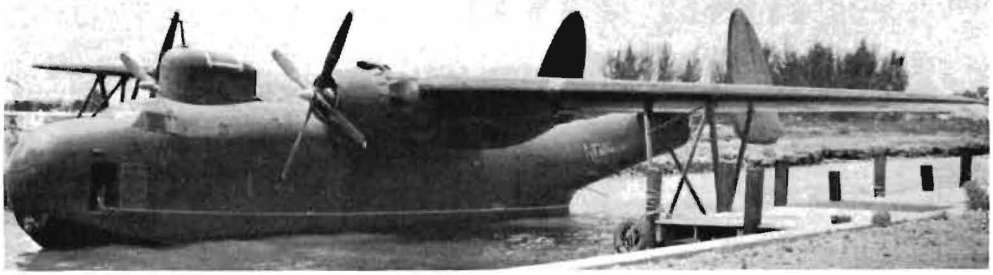
The 1952-built prototype Piaggio P.150 (T-6 Texan replacement) now has revised duo-bubble canopy and a machine gun in the starboard wing—camera in port wing. No production order is anticipated.

TWO OF A KIND

Likely to cause possible recognition confusion are these two twin-boom cargo transports, the U.S.A.F., French-based Fairchild C-119C-FA Packet (*above*) and the Nord 2501 Noratlas (*right*), the latter now engaged in North African operations against the rebels. This recent production model (2501-90) has the now standard increased area dorsal fillet. The Noratlas is to be built (112) in Western Germany by Flugzeugbau Nord. An initial batch (25) will be French-built. (*Photos: BR/SPB, France.*)

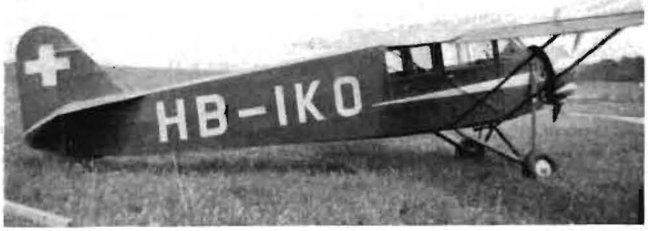


AIR PICTORIAL'S AUGUST— PHOTO REVIEW

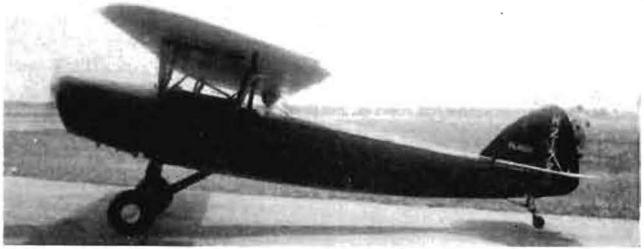


PANAMANIAN PBM-5R

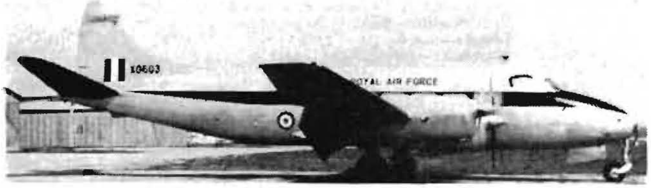
With crudely-daubed ferry registration N10419, this ex-U.S. Navy Martin PBM-5R Mariner (BuAer 95011) was photographed on its way from N.A.S. Norfolk, Va., to Panama. The U.S. Navy is now releasing all of its PBM-5 Mariners to civilian buyers—less radar and armament. In this case, the PBM-5R was already converted as a forty-eight "bucket-seat" transport (five crew). Note the JRM Mars-type bows' transparency. First seen on PBM-3Rs and PBM-5Gs (U.S.C.G.). PBM-3Rs were U.S.N. contract-flown by P.A.A. and AmExport Airlines during the war. (*Photo: Harold G. Martin, Florida, U.S.A.*)



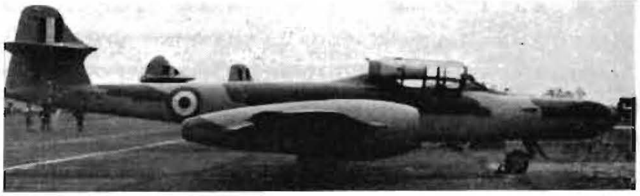
A 1928/30 Swiss-built Comte A.C.4 Gentleman (ex-CH-262) two-seater is still flying. Owner is A. Kammacher of Lausanne. Power is a 140-h.p. close-cowled, British-built Armstrong Siddeley Genet Major. (*Photo: R. Brown, Isleworth, Middx.*)



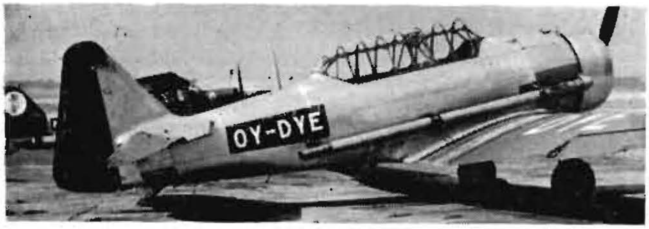
The 1941-built Player Monoplane (N21778) has unusual all-wood (fabric-covered) Geodetic construction (as Vickers Wellington). Power is 65-h.p. Continental; a.u.w. 750 lb.; cruise 100 m.p.h.; span 30 ft. (*Photo: Burton Kemp, via "U.S. Flying News".*)



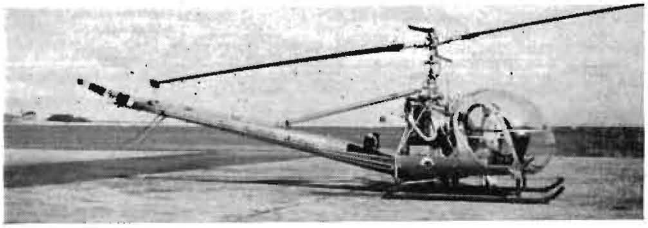
Smartly bedecked with "Royal Air Force" on the white top decking is this de Havilland D.H.114 Heron Srs. 2 (XG603) which is based at Washington, D.C., for the use of the British Ambassador, Sir Roger Makins. (*Photo: Merle Olmsted, Chicago 51, Ill., U.S.A.*)



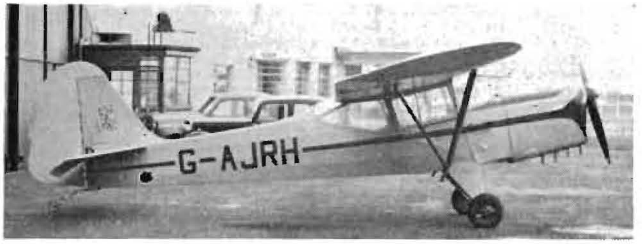
In June "Letters" Reader Porteous mentions the Ferranti on-loan Meteor "11½" (WD670)—which was illustrated in the April issue. Now another reader has produced a "normal-nosed" M.o.S. Meteor "11½" (WD791) complete with wing 20-mm. cannon.



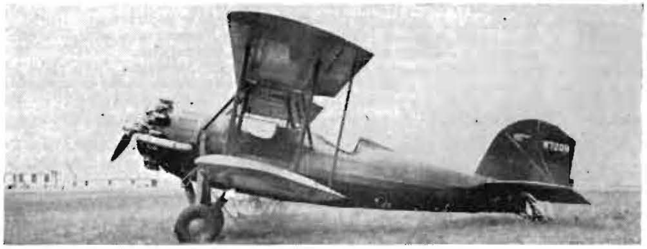
A sky-writing North American AT-6A Texan (ex-Flygvapnet Sk 16) bought in May 1955 by Herr A. P. Botved and normally based at Düsseldorf. Smoke chemicals are in rear cockpit and fed to engine exhaust through stack. Visible in background is B.K.S.'s Auster 5 G-AKWS.



First photo of the new Hiller 12-C (U.S. Army H-23C) mounted on skids. Canopy is more rounded. This is Australia's first commercial helicopter—T.A.A.'s VH-THA, beating A.N.A. by one day. W. German air force will have 14 Model 12-Cs. (*Photo: James Dyson, Belfield, N.S.W., Australia.*)



Now called the Auster Alpha, the Auster J/1 conversion to J/1N standard is clearly shown in this photo of G-AJRH (c/n. 2606 of 1947) which belongs to Newcastle-upon-Tyne civic authorities. The chief modifications are the larger Aiglet/Autocar tail and the more powerful 130-h.p. Gipsy Major I. (*Photo: D. Akhurst, Newcastle upon Tyne 4.*)



A comparatively little-known pre-war American two-seater is the Spartan Model C-3-225 (N720N) shown here with a 250-h.p. Wright Whirlwind R-760, driving a metal two-blade airscrew. Spartan also built Models 7-W (1936) and 12 Executive (1946) cabin monoplanes, plus C-3 dev. U.S. Navy NP-1 (1940)—201 built.

British Civil Register News

NEW REGISTRATIONS

G-AOCU	Auster 5 (986)—B. H. Birch
G-AOCV	D.H.82A Tiger Moth (82869)—J. G. Powell
G-AOCW	D.H.82A Tiger Moth (T.5429)—Hants and Sussex Aviation Ltd.
G-AOCX	D.H.82A Tiger Moth (T.6235)—Rollason Aircraft and Engines Ltd.
G-AOCY	Auster J.P. Autocar (3258)—Bristol Aero-Engines Ltd.
G-AORB	Bristol 173 (13206) (Previously G-AMYH)—Bristol Aircraft Ltd.
G-AORK	D.H.CJ Chipmunk 22 (C1/0238)—Universal Flying Services Ltd.
G-AORL	D.H.CJ Chipmunk 22 (C1/0131)—Universal Flying Services Ltd.
G-AORY	D.H.82A Tiger Moth (DE.528)—Rollason Aircraft and Engines Ltd.
G-AORZ	D.H.82A Tiger Moth (T.7740)—Rollason Aircraft and Engines Ltd.
G-AOSD	D.H.82A Tiger Moth (T.5826)—W. A. Webb
G-AOSE	D.H.104 Dove 6 (04470)—Smiths Aircraft Instruments Ltd.
G-APAA	Auster J5R Alpine (3303)—The Automobile Association

RESTORED TO REGISTER

G-AMJJ	D.H.104 Devon I (04267)—The Secretary of State for Air

CANCELLATIONS

(*Abbreviations: D—destroyed, SA—sold abroad, WU—withdrawn from use*)

G-AFPP	Piper Cub Coupe J.4 (4-441) (*SA*—Germany)—W. Smyth
G-AGJE	Avro 685 York C.I (MW.129) (*WU*)—Skyways Ltd.
G-AHEY	Avro 685 York C.I (1302) (*SA*—Arabian Airlines)—Skyways Ltd.
G-AKBZ	Avro 689 Tudor 5 (1418) (*WU*)—Not known. Temporarily unregistered
G-AKCB	Avro 689 Tudor 5 (1420) (*WU*)—Not known. Temporarily unregistered
G-AKGR	Miles M.14A Hawk Tr. 3 (T.9695) (*D*)—Blackpool and Fylde Aero Club
G-AKSG	D.H.89A Rapide 4 (R.L.949) (*SA*)—V. H. Bellamy
G-AKYO	D.H.82A Tiger Moth (T.7470) (*SA*—Germany)—John Neasham Ltd.
G-ALCM	Percival P.50 Prince I (P.50/1) (*WU*)—Hunting Percival Aircraft Ltd.
G-AMUL	Avro 685 York C.I (MW.308) (*D*)—Scottish Airlines (Prestwick)
G-AMYA	Miles M.57 Aerovan 4 (29) (Construction not completed)—Air "Ads" Ltd.
G-AMYC	Miles M.57 Aerovan 4 (47) (Construction not completed)—Air "Ads" Ltd.
G-ANGB	Percival Proctor 3 (LZ.597) (*SA as* VH-GGB)—D. B. Maclure
G-ANGY	D.H.82A Tiger Moth (DE.268) (*WU*)—Not known. Temporarily unregistered
G-ANLB	D.H.82A Tiger Moth (T.7453) (*WU*)—Not known. Temporarily unregistered
G-ANLC	D.H.82A Tiger Moth (T.6945) (*WU*)—Not known. Temporarily unregistered
G-ANLD	D.H.82A Tiger Moth (EM.773) (*WU*)—Not known. Temporarily unregistered
G-ANMU	D.H.82A Tiger Moth (T.6903) (*WU*)—Not known. Temporarily unregistered
G-ANPN	D.H.82A Tiger Moth (N.9310) (*SA*—Germany)—J. F. Morgan
G-ANWW	Avro 19 Series 2 (V5.512) (*SA as* VP-YOF)—The Fairey Aviation Co. Ltd.
G-AOED	D.H.82A Tiger Moth (R.5216) (*SA*—Germany)—Darlington and District Aero Club Ltd.
G-AOHC	D.H.82A Tiger Moth (W.6419) (*D*)—J. M. Jones
G-AOJO	D.H.CI Chipmunk 22 (C1/0113) (*SA as* D-EDUG)—Airways Aero Associations Ltd.
G-AOJP	D.H.CI Chipmunk 22 (C1/0199) (*SA*—Germany)—Airways Aero Associations Ltd.
G-AOJR	D.H.CI Chipmunk 22 (C1/0205) (*SA as* D-EGIM)—Airways Aero Associations Ltd.
G-AOJS	D.H.CI Chipmunk 22 (C1/0192) (*SA*—Germany)—Airways Aero Associations Ltd.
G-AOJU	D.H.106 Comet I.XB (06021) C. of A. renewed for 14 days. Transferred to R.A.F.—de Havilland Aircraft Co. Ltd.
G-AOJX	D.H.82A Tiger Moth (K.4276) (*SA*—Belgium)—Rollason Aircraft and Engines Ltd.

ALTERATIONS

G-ADNB	D.H.87B Hornet Moth (8080)—Not known. Temporarily unregistered
G-AEKY	D.H.87B Hornet Moth (8102)—Not known. Temporarily unregistered
G-AEUT	Hillson Praga (H.A.35)—C. M. Roberts and Partner
G-AEWY	D.H.87B Hornet Moth (8116)—Not known. Temporarily unregistered
G-AFEZ	D.H.89A Rapide (6408) C. of A. extended for 7 days.—Hants and Sussex Aviation Ltd.
G-AFHS	B. A. Swallow 2 (490)—R. R. L. Windus
G-AFMS	Mosscraft M.A.2 (2)—J. S. Eynon and Partners
G-AFWN	Auster 5 J.I Autocrat (124)—Mitchell Aircraft Ltd.
G-AGVL	Auster 5 J.I Autocrat (1860)—N. Rutter
G-AGVP	Auster 5 J.I Autocrat (1875)—Mitchell Aircraft Ltd.
G-AHGW	Taylorcraft Plus D (222)—The Wiltshire School of Flying Ltd.
G-AHSO	Auster 5 J.I Autocrat (2123)—Mitchell Aircraft Ltd.
G-AHXE	Taylorcraft Plus D (LB.312)—The Wiltshire School of Flying Ltd.
G-AIGK	Auster 5 J.I Autocrat (2173)—D. E. Harrington and Partner
G-AJAR	Auster 5 J.I Autocrat (2232)—Not known. Temporarily unregistered
G-AJEW	Auster 5 J.I Autocrat (2302)—Vendair (London) Ltd.
G-AJKS	Miles M.65 Gemini IA (6289)—Eagle Aircraft Services
G-AJOE	Miles M.38 Messenger2A (6367)—Not known. Temporarily unregistered
G-AJUW	Auster 5 J.IB Aiglet (2634)—Skegness Air Taxi Service Ltd.
G-AJXY	Auster 4 (792)—Not known. Temporarily unregistered
G-AJYR	Auster 5 J.IB Aiglet (2646)—Skegness Air Taxi Services Ltd.
G-AJYT	Auster 5 J.IB Aiglet (2660)—Skegness Air Taxi Services Ltd.
G-AKAA	Piper J3C-65 Cub (10780) Renewal of Validation of U.S.A.—M. A. Jeffery and Partners
G-AKAT	Miles M.14A Hawk Tr.3 (T.9738)—Not known. Temporarily unregistered
G-AKBO	Miles M.38 Messenger 2A (6378)—W. S. Shackleton Ltd.
G-AKXK	Percival Proctor 3 (HM.342)—L. J. du Preez and Partner
G-AKYB	Percival Proctor 5 (Ae116)—J. Maitland
G-ALDU	H.P.81 Hermes 4 (H.P.81/21)—Kuwait Airways
G-ALDX	H.P.81 Hermes 4A (H.P.81/24)—Kuwait Airways
G-ALER	Percival Proctor 3 (LZ.673)—Not known. Temporarily unregistered
G-ALES	Percival Proctor 3 (DX.181)—C. T. Bingham
G-ALGE	D.H.89A Rapide (6907)—L. S. Dawson
G-AMHJ	Douglas C.47 Dakota 3 (13468)—Not known. Temporarily unregistered
G-AMME	Miles M.65 Gemini 3A (WAL/C1006)—Whiteley (Rishworth) Ltd.
G-AMMR	Auster 5 J.IB Aiglet (2744)—Skegness Air Taxi Services Ltd.
G-AMPJ	Auster 5 J.5 (2905)—Skegness Air Taxi Services Ltd.
G-ANAU	Auster J 5F Aiglet Tr. (3110)—W. S. Shackleton Ltd.
G-ANCX	D.H.82A Tiger Moth (T.7229)—W. Cooper
G-ANCZ	D.H.82A Tiger Moth (W.7970)—Not known. Temporarily unregistered
G-ANHU	Auster 4 (MT.255)—G. E. A. Moore and Partner
G-ANKT	D.H.82A Tiger Moth (T.6818)—P. Falber and Partner
G-ANLE	Douglas C.47 Dakota 3 (42-92204)—Air Kruise (Kent) Ltd.
G-ANNZ	Auster 5 J.IB Aiglet (3128)—Skegness Air Taxi Services Ltd.
G-ANRK	D.H.82A Tiger Moth (DE145)—Mrs. O. J. Marmol
G-ANYS	Percival Proctor 4 (NP.250)—W. R. Croysdill
G-ANYZ	Percival Proctor 4 (RM.190)—Not known. Temporarily unregistered
G-AOCH	Vickers Viking I (150)—Dragon Airways Ltd.
G-AOGS	D.H.82A Tiger Moth (3815)—Mrs. J. E. Dickinson
G-AOIP	D.H.82A Tiger Moth (R.4765)—R. A. Short
G-AOIS	D.H.82A Tiger Moth (R.5172)—F. G. Miles Ltd.

AIRPORT NOTES—INTERESTING VISITORS

Blackbushe

30/5	F-BCJM	B170 Mk. 21—M. Boussac; (A) Le Bourget
	G-ANBF	Britannia—B.O.A.C.; approaches
12/6	122209	Mercator—U.S. Navy
15/6	21009	T-33—R.C.A.F.
19/6	6601	C54—Portuguese Air Force; (A) Orly
22/6	N2966	Mallard—M. Boussac
26/6	D-AEDA	Viking—Dr. Tigges Fahrten; (A) Dusseldorf
28/6	N9869F	Mosquito—(A) Carlisle

Croydon

5/6	PH-LPS	Super 18—ex-N3600B; Phillips Gloeilampen Ltd., Eindhoven
6/6	N2966	Grumman Mallard—M. Boussac; visiting for Epsom races
7/6	N238B	Cessna 195—Mr. P. Gluckmann; "City of San Francisco"; trans-Atlantic flight
13/6	N1127P	Apache—Radio Check by Avionics Ltd.
14/6	F-BHDJ	Cessna T50 Bobcat—Escadrille Mercure, Le Bourget
26/6	HB-OTA	Leopard Moth—c/n. 7007; Section Vaudoise del Aero Club Suisse
	OY-AAV	KZ VII—Esper Boel, Alslev
	F-BFQN	Piper Cub—c/n. 11725; A. C. Paul Tissandier, Montesson
	OO-MPH	Bonanza
30/6	G-AIXN	Sokol—c/n. 112, ex-OK-BHA; A. R. Pilgrim, Elstree
	F-BFPK	Navion—c/n. 1054; Bucaille, Toussus
2/7	G-ACZP	D.H.86B Express—c/n. 2321; Lancashire Aircraft Corp.
	F-BBCM	Nord Noralpha—S.N.C.A. Du Nord, c/n. 8; Les Mureaux
	F-BEQY	Nord Norecrin—c/n. 159; Marcel Doret, Guyancourt

London

4/6	N7111c	L1049G Super Constellation—T.W.A. "Star of Toledo"
5/6	N733PA	DC-7c—P.A.A. "Clipper Blue Jacket"
8/6	G-AOEN	Twin Pioneer—Scottish Aviation Ltd.
9/6	SE-BSH	Scandia—S.A.S.
	N90444	Skymaster—Flying Tiger Line
12/6	VH-TVI	Viscount 756—Trans-Australian Airlines; delivery flight
14/6	VP-YNC	Viscount 748—Central African Airways "Mlanje"; c/n. 100; delivery flight
18/6	OD-ACG	Viscount 732—Middle East Airlines first service to London (ex-G-ANRT, c/n. 76)
22/6	ZS-AUA	Skymaster—South African Airways freighter
23/6	XK670	Comet 2—R.A.F. Transport Command (ex-G-AMXF, c/n. 06028)
26/6	VH-TVJ	Viscount 756—Trans-Australian Airlines delivery flight
27/6	G-AGRG	Tudor 4—Air Charter Ltd.
28/6	VP-YND	Viscount 748—Central African Airways "Mweru"; c/n. 101; left for Moscow

Northolt

5/6	No. 142	NC702 Martinet—French Air Force
	No. 22	SO.30P Bretagne—French Air Force
6/6	53-6167	L-23B—U.S. Army
15/6	WN161(G)	Balliol T2
	52-6137	L-20A—U.S.A.F.
	52-6132	L-20A—U.S.A.F.; red fin and wingtips
20/6	WH380	Meteor F-8—camouflaged
21/6	KN269	C-27—R.C.A.F.; camouflaged
26/6	WN159	Balliol T2
	No. 30	SO.30P Bretagne—French Air Force
	No. 37	SO.30P Bretagne—French Air Force
27/6	C-45	R.C.A.F.
30/6	XA867	Whirlwind I FAA
2/7	447208	C-45—French Air Force

Prestwick

7/6	N238B	Cessna 195—(E) Peter Gluckman; solo trans-Atlantic crossing
	CF-MCB	Douglas DC.4—(W) Maritime Central Airways
8/6	O-328060	North American TB-25N Mitchell—(W) U.S.A.F. (H.Q. Air Defence Cmd., Washington)
11/6	I-LYNX	Douglas DC6B—(W) L.A.I. (Shannon Diversion)
12/6	N9908F N9932F	Lockheed Lodestars—(W) Minnesota Airmotive
13/6	124367	Martin P4M-1Q Mercator—U.S. Navy (Coded PS-1)
21/6	SE-CBM	Piper Apache—(E) delivery to a Stockholm car company
22/6	124373	Martin P4M-1Q Mercator—U.S. Navy (Coded PS-3)
24/6	N75416	Douglas DC4—(W) Trans Caribbean Airways
28/6	N4321D	Beech Super 18—(E) Indamer Corporation
29/6	CF-HMS	D.H. Mosquito P.R.35—(W) Spartan Air Services (ex-RS700)
30/6	N9869F	D.H. Mosquito P.R.35—(W) Jack Amman, Photogrametric Engineers Inc.
	N30058	Douglas DC4—(E) Flying Tiger Line

Viscount Deliveries (Dates in parentheses)

Capital Airlines: N7427 (12/6); N7428 (20/6); N7429 (30/6)
Compania Cubana de Aviacion S.A. CU-T605 (Fitted with slipper tanks)

FORTHCOMING EVENTS

3rd–6th Aug.	World Championships for mechanically-powered models. Cranfield Aerodrome, Beds.
5th Aug.	National Contests for radio-controlled models organised by Radio Control Society. Cranfield Aerodrome, Beds.
25th–26th Aug.	International Air Rally organised by Midland Aero Club. Elmdon Airport, Birmingham.

Did You Know . . . ?

Spot Aviation News from all over the World

CANADA. Since last March, Canadair have been bench-running the Wright R-3350 Turbo-compound 18 engine intended for the CL-28; the engine is rated at 3,700 h.p. and uses water injection for take-off. The Curtiss Electric airscrew is 15 ft. in diameter.

● Having had their promised CF-100s taken away from them, at least some of the twelve auxiliary squadrons of the Royal Canadian Air Force will re-equip with Sabres. (D.Y.K.? July.)

● As well as the H-21As operating with Search and Rescue squdrons, the R.C.A.F. are using twelve H-21Bs in the construction of the Mid-Canada radar fence.

CZECHOSLOVAKIA. Latest version of the Zlin Trener is the 226, powered by a Walter Minor 6/III. One of these all-metal sporting machines, capable of 144 m.p.h., OK-JEB, will be performing in the Lockheed Aerobatic Trophy at Baginton.

FRANCE. Fresh figures are to hand on the subject of French Government orders: Mystère—150 Mk. II (40 delivered), 325 Mk. IV A (128 delivered); Super Mystère—Mk. IV B2 150, with option on a further 220, delivery to start next year; Vautour—140 of various marks, first deliveries this year, and possibly a further 220; Noratlas—95 in service out of an order of 160; Aquilon—90, mostly delivered; MS 733—130 (70 delivered); other types on order of which none have yet reached the Air Force, include the SE 3130 Alouette II (180), SO 1221 Djinn (100), Broussard (310), Magister (95) and Breguet 765 (15). Not yet confirmed is an order for 50 MS 760.

● SNCASE have been given an order for two prototypes of the SE-116 Fonceur colonial aircraft. Intended for patrol and ground attack, it will be powered by two Turbomèca Bastan propjets of 800 h.p. each. The prototype, however, will probably fly with two 600-h.p. SNECMA 12 S.

● SIPA have also received an order, this time for ten pre-production aircraft, for a similar type of machine.

● Besides the twelve Caravelles ordered for Air France, four prototypes are to be built. The first two are flying, and the others are intended for static and fatigue tests. Flying prototypes are F-WHHH and F-WHHI. HI first flew on 6th May.

● A Fouga Magister is to be sent to Canada later this year in order to evaluate it for use as a light jet trainer for the Royal Canadian Air Force.

● India is supposed to have ordered 110 Dassault Mystère IV A fighters, powered by the Hispano-Suiza Verdon, for her Air Force, but the story is not, so far, confirmed.

● Fouga have been granted a licence to construct the Dornier Do 27; an example, EC-AKY, was recently demonstrated before Army representatives at Toussus-le-Noble.

● In contradistinction to the last item, the German company of Norflug is to build the Nord Noratlas. Twenty machines will be supplied initially by the French company and later replaced by others built in Germany. The first order for the new Luftwaffe will be for 137 machines. Many components, including the motors, will continue to be supplied by France.

● Figures released by the French show that they expect to have delivered 127 helicopters to Algeria by the end of July. The first of the trials batch of American helicopters (D.Y.K.? June) arrived there recently on the "Dixmude" as part of GMH-57. [57th (mixed) Helicopter Group.] The Group consists of four Sikorsky S-58, three Sikorsky S-55 and fourteen Vertol H-21.

GERMANY. At the DVL, Essen-Mülheim (Deutsche Versuchsanstalt für Luftfahrt) the Blume B1-500 VO is undergoing static tests.

● An interesting Austrian post-war light plane, the OFW OK 15, is a two-seater low-wing monoplane powered by a Walter Minor 4/III of 105 h.p. Span is 25 ft., length 21 ft. 4 in. and height 5 ft. 6 in. It bears a certain resemblance to the war-time Skoda SK V8.

● A Dresden firm are to build for East Germany — or Russia — 85 IL-14s. The order is expected to be completed by 1958. There are rumours also that a twin-jet military aircraft, referred to as the Baader-Bonnin BB 152, is to be started next year.

● Another German firm looks like getting back into the aviation business. Blohm & Voss intend to build a twin-Eland transport with CASA in Spain. Heinkel has CASA interest as well; in this case a light fighter with a Bristol Orpheus.

HOLLAND. Orders in Europe for the Friendship, besides those noted already (D.Y.K.? July) are two for K.L.M. and five for Aer Lingus, as well as half a dozen to an unspecified customer.

ITALY. Construzioni Aeronautiche Giovanni Agusta, who build Bell 47s under licence, are negotiating with the American company with reference to building a Zappata-designed commercial helicopter to carry 14 to 16 passengers. Technical director Zappata also has plans for a vertical take-off project.

● The first flight of the Italian light fighter, the Aerfer Sagittario II, was made on 19th July.

● The Derwent-engined Sagittario II is a step towards the Ariete light fighter, three of which have been ordered as prototypes. The latter will have the Derwent supplemented by a Rolls-Royce Soar mounted in the tail.

JAPAN. With Mitsubishi busy on the order for 110 F-86Fs for the Japanese Government, a successor, possibly F-100 or F-104, is already being considered.

U.S.A. Two Chance-Vought Crusaders have crashed following a failure of the wing attachment to the fuselage.

● The first F-102 unit is now being formed in the United States; main armament of this fighter will be the Hughes' Falcon.

● K-600 is the designation of an export version of the U.S. Navy Kaman HOK-1, now being offered by the company. The helicopter has a crew of two and can take three passengers.

● The first of two Convair 440 Metropolitans ordered by the Royal Australian Air Force is now flying in Australia for the R.A.A.F. V.I.P. Flight.

● Newest designation in the "Century" series of fighters, the North American F-107 has been cancelled. It was to have been a development of the F-100 with cheek intakes.

● Two new guided weapons of the Bowmarc and Falcon type, Duck and Goose, have been named. They are apparently intended as armament for the Hustler.

● "B" versions are announced of the Voodoo and F-101; the former a two-seat long-range interceptor and the latter a longer range single-seater with extra fuel in a bigger wing.

● The Ryan XF-109 has been redesignated X-13. At present supposed to be undergoing ground trials at Edwards Air Force Base, the X-13 is a vertical take-off delta aircraft with one Rolls-Royce Avon.

● Phase III flight tests will be carried out on three Cessna XT-37s under a government contract.

● With fourteen orders for the Friendship and options for twenty others, Fairchild will go into quantity production soon.

● Variants of the A3D Skywarrior are the photographic and radar countermeasures versions labelled respectively A3D-2P and A3D-2Q.

● The Frye F-1 Safari is being shown in mock-up form with a high degree of finish; airline orders for the F-1 have come in from Wien Alaska, Northern Consolidated and Cruzeiro do Sul.

● The Douglas F5D all-weather naval fighter, which first flew on 12th April, has been named Skylancer. (D.Y.K.? July.)

● A supersonic jet trainer is to be built by Northrop Aircraft, Incorporated.

● Douglas are "scaling-down" the DC-8 to meet the threat of the small jet airliner represented by the Convair Skylark 600. The DC-9 will be powered by either the J79, like the Skylark, or by the Pratt & Whitney J52, which is a Navy turbojet of some 7,500-lb. thrust. It is being developed in place of the abandoned T52 turboprop, and is, in effect, a scaled-down J57.

Air Cadets to Visit Canada and U.S.A.

SIXTY members of the Air Training Corps and the R.A.F. Section of the Combined Cadet Force will fly overseas this summer for three-week tours under the 1956 International Air Cadet Exchange Scheme. The cadets left London Airport on 19th July—twenty-five for Canada, twenty-five for the United States and ten for European countries—and return home on 13th August. They are aged between 16 and 18.

Cadets flying to Canada as guests of the Air Cadet League of Canada will first go to Montreal and then fly across the continent for a stay of twelve days in Vancouver and the Rocky Mountains, returning home via Ottawa.

The U.S.A. party will spend the first four days sightseeing in Washington (including a visit to the White House and the Capitol). The cadets will then fly to Chicago, where they will be guests of the State of Illinois for ten days. During this part of the tour, the cadets will see some of America's largest industrial plants such as the Ford motor works.

Of the cadets going to Europe, two will visit France, two Holland, two Italy, two Norway and two Sweden, where they will be the guests of the air cadet organisations of those countries.

While the cadets are abroad, the Air Training Corps here will be host to sixty air cadets from other countries who will spend three weeks touring the British Isles. This is the ninth year of the air cadet exchange scheme.

R.34 MEMORIAL

TO commemorate the historic voyage of the British Aircraft R.34, which arrived at Pulham, Norfolk on 13th July 1919, having achieved the first east to west and the first double crossing of the Atlantic ocean by air, the Air League of the British Empire has obtained the consent of the Minister of Transport and Civil Aviation to the erection of a memorial at London Airport.

The East Lothian County Council, and the responsible American authorities, have agreed to the fixing of commemorative plaques at the former East Fortune Aerodrome, where the airship took off on its Atlantic voyage, and at Mineola, Long Island, where it landed in the United States.

The Air League, which is assuming the main financial responsibility for the commemoration, will welcome contributions addressed to Londonderry House, 19 Park Lane, London, W.1.

NAVAL NEWS

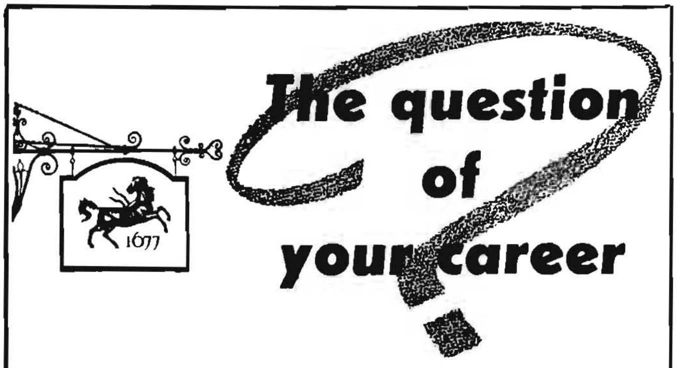
THE first landings by reserve pilots of R.N.V.R. Air Squadrons with jet aircraft on an aircraft carrier are to be made this summer. The landings will be made in the English Channel during periods of annual continuous training by three squadrons of the Southern Air Division, R.N.V.R. and one squadron of the Northern Air Division, R.N.V.R. They will be made on the aircraft carrier *Bulwark*.

TELEGRAPHISTS

THE Telegraphist Air Gunners' Association wishes to make itself known to all former Fleet Air Arm Telegraphist Gunners, Telegraphists (Flying) and air Crewmen. The association exists to maintain the comradeship which grew up before and during and since the second world war. It publishes a magazine and holds regular dinners. The Secretary is Mr. A. R. Davis, 9 Jonathan Road, Fareham, Hants.

ROYAL AUXILIARY AIR FORCE APPOINTMENT

THE Air Ministry announces the appointment of Squadron Leader D. A. G. Parry, D.S.O., D.F.C., as Commanding Officer of No. 3620 (County of Norfolk) Fighter Control Unit, Royal Auxiliary Air Force. No. 3620 F.C.U. is located at Old Catton Camp, Constitution Hill, Norwich.



Have you considered banking? Of those young men who join the Bank today ONE IN EVERY TWO will be required for Branch Management or other positions of responsibility — many in their early thirties.

General Qualifications: A Public School or Grammar School education with School Certificate or the General Certificate of Education at Ordinary Level with passes in at least four subjects including English and Mathematics.

Remuneration: Salaries are based on a scale giving increases at each birthday, all new entrants being placed initially in Grade 'C'. From 1st September, 1956, remuneration in London will range from £400 at age 20 to £475 at age 23 and progressively beyond. Provincial remuneration will be £50 lower. At 24 years of age or later, subject to a probationary period, those regarded as the most able and promising for future promotion are selected for transfer to either of the two higher Grades carrying substantial increases.

A descriptive brochure will be sent on request.

The Staff Manager

LLOYDS BANK

HEAD OFFICE: 71 LOMBARD STREET E.C.3

EXPORTS STILL SOARING

THE Aircraft Industry's spectacular export effort this year shows no sign of abating. A total of £7,760,641 was achieved during April, this being the third highest monthly total ever recorded, surpassed only by the February and March figures.

The figure, so far, for 1956—£37,090,500—exceeds this country's annual aviation export totals for every year except 1951–55 and represents an annual rate of £111,271,797.

Once again, the United States was the best customer with £1,082,349: Canada (£681,511), Sweden (£527,145), Belgium (£332,915) and Australia (£324,026) came next.

First Flight Test of New Rolls-Royce Engine

A ROLLS-ROYCE Tyne propeller turbine has successfully completed its first flight installed in the nose of an Avro Lincoln flying test bed. The Tyne assisted in the take-off and ran throughout the flight which lasted one hour forty minutes. During the flight performance testing of the Tyne was commenced and the Lincoln flew with the two outboard Merlins stopped. The aircraft was flown by Mr. A. J. Heyworth, D.F.C., the company's chief test pilot with a crew of two.

BRISTOL BE25 ENGINE NAMED "ORION"

THE Bristol BE25 "supercharged" turboprop is now named *Orion*. Development of this engine, which is to power later versions of the Britannia airliner, is being pushed forward urgently so that it can be put into production early in 1959. Unlike most gas turbines, which progressively lose power as they climb, the Orion will provide a constant power of over 4,000 h.p. from sea-level up to about 20,000 ft. It will therefore give full take-off power at any airfield in the world, irrespective of climate or elevation.

Letters to the Editor

THE P.1101

IN his article on the TU-104 (*Air Pictorial*, May 1956) "Boffin" writes that the SAAB J.29 was associated with the Focke-Wulf project of Kurt Tank. During a visit to the SAAB factory not so long ago I was told that the J.29 was originally known as the P.1101 after the Me P.1101. SAAB, however, developed the design to a much higher degree of efficiency.

In the United States a machine was built in an almost identical form to the P.1101 as the Bell X-5. In England the design was adopted by de Havilland and formed design studies for an early D.H.110 and several subsequent designs, which bore no relation to the eventual product.

In the U.S.S.R. the type seems to have given rise to the MiG 9, which provided data to develop a Focke-Wulf project to the MiG 15. That, however, is surmise until confirmed.

In France the detail design for the original P.1101 was complete and the experience gained helped in the design of the SO.6020

The only exact copy of the P.1101 is the Bell X-5, as in all other cases the countries concerned have varied the design with some increase in efficiency. The original concept, however, has been praised by many aircraft engineers.

If the German Aircraft Development Programme had not been cut in this country the performance of a Derwent-powered P.1101 would have been an eye-opener. As it happened, several German designs being tested crashed, and many intriguing ideas were dropped.—**Archangel, Northants.**

MANN-GRIMMER GUN-CARRYING BIPLANE

PERHAPS the following information on this aircraft may be of interest to readers.

Your photograph (*Air Pictorial*, December 1955) shows the Mann Biplane with the modified undercarriage. Previous to this it had landing skids in front and behind the wheels and a streamlined helmet-type boss in front of the engine.

According to Mr. Grimmer (the co-designer) the first model reached a speed of 60 m.p.h., but after a large rudder and improved propellers were fitted, a speed of 70 m.p.h. was attained. Flown in August 1915 by Mr. Sidney Pickles, the Mann-Grimmer climbed to 3,000 ft. in ten minutes, and 5,000 ft. in twenty minutes. On November 16th the aircraft crashed after the gearbox seized, and the momentum of the propellers snapped the chain drive. The pilot was A. E. Barrs, with J. Woodley passenger.

Mr. Woodley made the following notes about the flight:

10.28 a.m., take-off. 10.32¼, height 1,000 ft. 10.36½, height 2,000 ft. 10.41, height 3,000 ft. 10.54, height 5,000 ft. 11.11½, height 7,000 ft. 11.21, height 8,000 ft.

Mr. Grimmer stated that the wings were heavily cambered, with the front edges sloped back, partly for stability and partly to enable the Lewis automatic gun to be fired sideways. Mr. Grimmer adds that during the building of this machine a pint of light ale was served to all night-shift workers at the firm's expense every two hours.

The span and length of the machine, according to reports, was 36 ft. and 26 ft., but I cannot vouch for these figures.—**Douglass Whetton, Rykneld Way, Littleover, Derby.**

SLOW-COACH TROOPING

WE could have three magnificent troop-carriers in reasonably quick time if all the authorities concerned pulled their pants up, and the "It-can't-be-done brigade" remained in their holes.

The three Princess flying-boats could each be re-engined with six Rolls-Royce Tynes or Bristol Orions which should soon be available.

Thus powered, the Princesses could each carry about a hundred and fifty to two hundred troops in hops of three to four thousand miles.—**Geoffrey Dorman, Chelsea, London, S.W.3.**

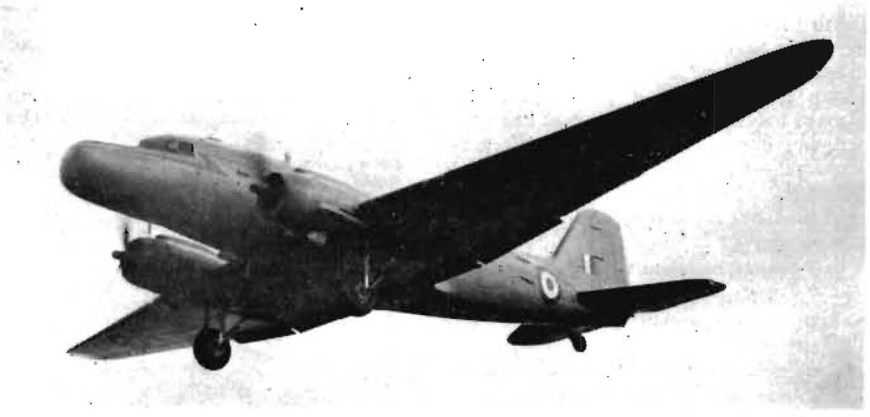
DAKOTA TS423

IN the February 1954 issue of *Air Pictorial* you published a photograph of a Dakota (serial TS423) with an extended nose containing radar. I have recently seen this machine flying again from Turnhouse aerodrome, and thought readers may be interested in some fresh details.

The protruding transparent perspex nose cone has been removed and the remaining portion flattened slightly. The machine is finished in an attractive dark blue paint overall with red cheat line running the length of the fuselage. As my photograph (*below*) shows R.A.F. markings are carried.

Spitfire RW393 has been assembled in the main hangar of Turnhouse and I hope to see it flying in the near future.—**K. Morrison, Edinburgh, 11.**

A new nose and paint job for DC-3, TS423. (*Photo: K. Morrison, Edinburgh, 11.*)



GROUNDED SWIFT

THE Comper Swift to which Mr. Read refers in the March issue of *Air Pictorial* is VH-UVC, which was formerly G-ACAG, c/n. S.32/10. This is in the course of being rebuilt, although I understand that the project is being held up by want of spare parts for its Pobjoy . . . (or even for want of a new engine). The machine itself, however, is in quite good condition, and I think it is probable that it will eventually fly again.

Another interesting machine to be seen at Moorabbin is the Miles Hawk Major VH-ACC. This was formerly G-ACYZ, and has the c/n. 123 carried on a plate on the fuselage side. A wreck a year ago, this has now been fully restored by Air Operations Pty. Ltd., and often flies nowadays.—**E. A. Coates, Victoria, Australia.**

ABURO-EBIAN AND YUNKERU

I AM pretty certain that few Western readers will be able to make much of the following: Aburo-ebian and Bikkasu.

They are not secret code words for some ultra-modern rocket missiles but the phonetic translation of Avro Avian and Vickers which appear in a special appendix in Kenkyusha's New Japanese-English Dictionary printed in England during the last war by Lund, Humphries and Co. Ltd., of 12 Bedford Square, London, W.C.

This ten-and-a-half-page appendix contains some fascinating translations, which in effect, cast a direct bearing on foreign types of aircraft which were, at one time or another, used in Japan. I will quote a selection and leave readers to fathom out how the phonetics work, noting only that L, Q

(*Continued overleaf*)

LETTERS *(Continued)*

and V do not figure in the alphabet. "Ki" is 'plane.

Amerikan-iguru-ki (American Eagle); Aro-ki (Arrow); Beranka-ki (Bellanca); Berunaru-ki (Bernard); Birie-ki (Villiers); Burakkuban-ki (Blackburn—also lists translation for Blackburn Bluebird); Burerio-ki (Bleriot); Buru-ki (Buhl); Burisutoru-ki (Bristol); Dagurasu-ki (Douglas); Dokkusu-go (Do X—Dornier); Dorunie (Dornier—also Wal and Super Wal—flying boats); Erufu-ki (Elf), Faiatto-ki (Fiat); Farina-ki (Farina); Faruman-ki (Farman); Fea-chairudo-ki (Fairchild); Fokka-ki (Fokker); Goruden-iguru-ki (Golden Eagle); Guren-Machin-ki (Glenn Martin); Gurosta-ki (Gloster); Hainkeru-ki (Heinkel); Hamiruton-ki (Hamilton); Handore-peji-ki (Handley Page); Hanza-ki (DLH Lufthansa 'plane); Hoka-ki (Hawker); Honetto (Hornet—radial engine); Jipushi-mosu-ki (Gipsy Moth). Also mentioned are Hispano engine; Cant, Caproni and Curtiss; Keystone, Columbia, Krieder-Reisner (Fairchild), Klemm and Maguni Caspa (these last defeat me); also Morane, Mureaux and Nieuport; Parnall (which goes with the Elf mentioned above), Paramount, Pegasus, Piaggio and Potez; Ryan, Wright (motor and 'plane), Laird (spelt as "lard") Leoning, Liberty (motor); Lincoln-Page (?); Lockheed and Romano, Rohrbach and Rolls-Royce, Loire; Savoia, Sunbeam ('plane) and Cirrus Moth; Simplex (? 'plane); Short and Supermarine; Tampie-ki (Tampier 'plane?); Tom Tit (Hawker); Waco, Wapiti, Wallace and Wibault and finally Yunkeru (Junkers).

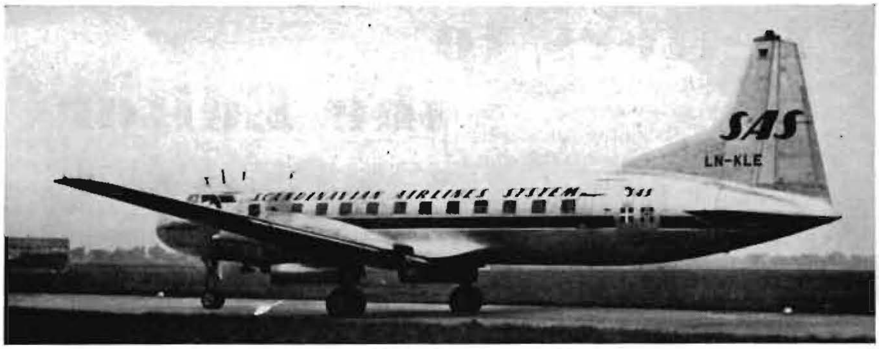
Perhaps someone might care to throw some light on the aircraft described as Hamilton, Maguni, Caspa, Lincoln-Page Simplex and Tampier?—**Air Historian, London, W.C.1.**

FIRST METROPOLITAN?

CONVAIR 440 Metropolitans are now being operated by Scandinavian Airlines System and I photographed *(above)* LN-KLE at Dusseldorf Airport on 31st May. Also present was an airship registered N.65N and decorated, if that is the word, all over with German advertisements. It was a colourful sight.

I visited the German National Air Day held at Wahn and Butzweilerhof on 2nd and 3rd June, and among the many interesting types was the Fischer R.W.3. This unusual aeroplane is powered by a Volkswagen engine driving a pusher propellor situated between the fin stern post and rudder, and it gave a surprisingly agile performance.—**Sgt. D. F. Gilpin, 2nd T.A.F., Germany.**

*(A silhouette and photograph of the R.W.*3 *appears on page* 275.)



First report of a Convair 440 Metropolitan in Europe comes from D. F. Gilpin, who took this photograph.

Participating aircraft at Wahn on 2nd June

HB-EKB		Aero 45S	
G-AMWI		Bristol 171	
D-EBYD		Bestmann	
54-604		C-123B	
D-EHOT		Cessna 172	
HB-CPH		Cessna 182	
G-AMZN		Dove Srs. 6	
XK.586		Vampire T.11	
12-XW	105	Mystère 4A	French Air Force Aerobatic Team
12-XX	106	,,	
12-XY	107	,,	
12-XF	111	,,	
12-XZ	112	,,	
D-EJAS		Fischer RW-3	
07		Fouga CM.170	
7		,,	
53-3218		C-119G-80-FA	
51-473		SA-16A	
WM.929		Seahawk F(GA)4	
WT.743	"R"	Hunter F.4	118 Sqn. Individual aerobatics
WV.364	"S"	,,	93 Sqn.
XE.687	"C"	,,	
XE.703	"P"	,,	
XE.718	"A"	,,	
XF.315		,,	Yellow and red check nose wheel door. Four small squadron markings on nose
XE.602		Hunter 6	
XJ.615		Hunter Trainer	
WV.755		Pembroke C.1	
G-AOHD		Jet Provost	
52-9960	TR960	T-33A-1-LO	USAFE Aerojets Fuerstenfeldbruck
52-9965	TR965	,,	
52-9966	TR966	,,	
52-9968	TR968	,,	
52-9969	TR969	,,	
F-BGVO		M.S.760 "Paris"	
54-1881	FW881	F-100C-20-NA	
61-NF	93	Nord 2501 Noratlas	
F-BGZD	4	Nord 2502	Booster jets at wingtips
I-PIAF		Piaggio P.149	
D-EBUD		PA-23 Apache	
51-11062	5-55	F-84G	Italian Air Force Aerobatic Team
51-16730	5-55	,,	
52-3012	5-34	,,	
52-8321	5-2	,,	
52-8415	5-62	,,	
52-8438	5-57	,,	
F-WHHL		Sipa 1000	
XE.175		Seamew A.S.1	
XD.920		Swift F.R.5	
F-WHHZ		SO.1221 Djinn	
47-508		H-19B	
G-AOCZ		Westland S.55	

At Butzweilerhof on 3rd June

F-BASO	Deux Ponts
D-EDEM	Tiger Moth
VP.957	Devon
HB-MIA	Jungmeister
SE-BHU	Klemm 35
D-EDOD	,,
D-EFAR	,,
61-OL	N.2501 Noratlas
FU-313	F-86E
FU-459	F-86E
F-BFRU	P.A.204 Super-Cigalle
F-BHHH	Caravelle
52-7554	H-19B

FOLLOW THE LIGHTS

I VISITED the U.S.A.F. base at Sculthorpe, Norfolk, recently and among the many aircraft I spotted a Convair T-29A navigational trainer (91941).* Another interesting aeroplane was a Boeing B-29 flight refuelling tanker. The nose designation was KB-29B but the aircraft was a KB-29P, with extra dorsal radome amidships and a fascinating system of lights to guide the F-84F, which the KB-29s now in Britain refuel, into position.

Also present was a B-47E-71-BW in the latest colour scheme and fitted with the now standard long-range tanks. My photograph *(below)* shows the huge bracing strut. No insignia was carried on fuselage and wings and there was no provision for JATO.—**M. J. F. Bowyer, Cambridge.**

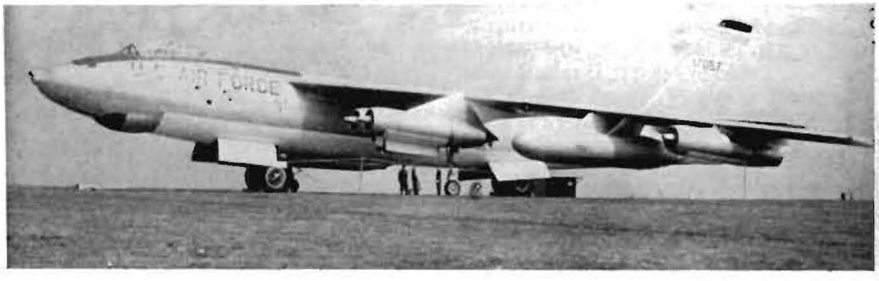
*(*Many readers have reported sightings of a Convair T-29A. Several have sent in photographs of this and the B-47E Stratojet and to them we extend our thanks.*—ED.)

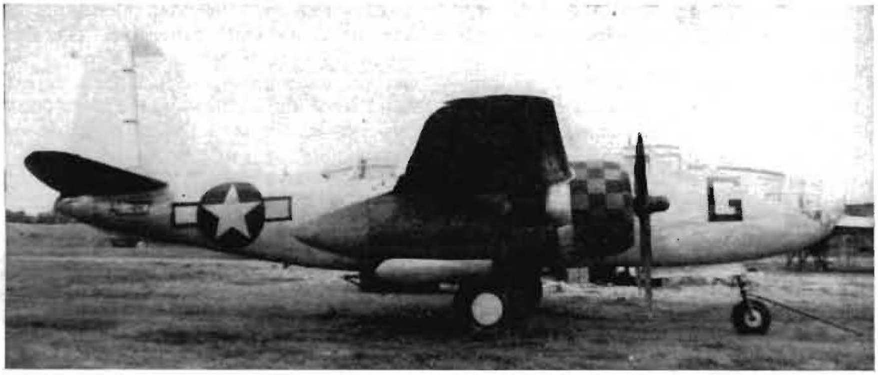
"LITTLE AMERICAS"

HAVING served at Felixstowe, May 1915 until April 1916, I was much interested in the account of the Porte flying-boats in Chronicler's article on American aircraft in the British Service *(Air Pictorial,* July 1955). I cannot remember any query being raised regarding the standard of workmanship of the "little Americas". Certainly the main draw-back was their poor engines. They had a bad name with the Royal Navy who often had to send a Destroyer to tow them back to Felixstowe from the North Sea. As regards the Curtiss H.12, my main recollection is the disintegration of the propellers of the first of these when the engines were started up inside the big hangar.

An important point is that the necessary work in preparing the H.4 and H.12 for

Long-range tanks are now standard fittings on Boeing B-47s and B-52s. Note the huge bracing struts on this B-47E's tanks. *(Photo: M. J. F. Bowyer, Cambs.)*





"Chronicler" and Bruce Robertson give the full history of Bostons and Havocs based in Britain during the last war on pages 263 to 267 in this issue. (*Photo: T/Sgt. M. Olmsted, Chicago, U.S.A.*)

flight was of inestimable value to the personnel of the R.N.A.S. as it was these raw recruits to aircraft construction who later built the Porte flying-boats.—**F/Lt. J. G. Glover, Fareham, Hants.**

ODD MAN OUT

BRUCE Robertson's article on British Military Serials (*Air Pictorial*, November and December 1955) prompted me to send a photograph (*above*) and some information of an unusual Douglas A-20.

This machine was apparently one of those ordered during the last war by the French; was taken over by the British, who in turn transferred it to the U.S. Air Force in Britain, as it bears U.S. markings but no U.S. serial number on its fin. Instead it carries a British serial number (AL397) on the rear fuselage. Maybe I am wrong but this seems an odd man out to me.

I have also seen a photograph (1944 edition of the *Aviation Year-book*) of a B-26 Mitchell which bore U.S. star and bar markings on the fuselage and on the *upper* surface of each wing, and British flashes on the fins.—**T/Sgt. M. Olmsted, Chicago, U.S.A.**

G-AFIR, OR IS IT?

HOW is this for a record? Two major crashes, one in which the airframe was completely wrecked, and still my Luton Minor, G-AFIR, looks none the worse for wear. (See photograph *below*.)

Its history makes interesting reading. Originally built in 1938, it was powered by a 32-h.p. Luton-Anzani inverted "vee". The unreliability of this engine eventually caused an untimely descent into a field of growing corn in 1939. The irate farmer, a Philistine no doubt, would not let the owner remove the plane until the corn was reaped three months later. Alas, it was a wet spring that year and the Minor, nose down in the oats, suffered badly.

Ultimately it was salvaged but war intervened and G-AFIR was relegated to the roof of a barn until I bought it in 1948 for the princely sum of £25.

I spent two years rebuilding it and in 1951 G-AFIR took to the air again, this time fitted with a 37-h.p. Aeronca JAP twin-cylinder engine. But fate was not finished and dirty petrol caused a forced landing in a highly unsuitable cow-field, completely wrecking the airframe.

Luckily enough I salvaged the engine and rebuilt G-AFIR and it is now completing test-flights at Elstree on a provisional test permit prior to granting a full permit.

Performance figures are not yet complete, but the following are available. Cruising speed 60–65 knts, stalling speed 24 knts. Wing span 25 ft.; length 21 ft. 6 in.; all-up weight 620 lb.—**A. W. J. G. Hume, Pinner, Middlesex.**

CRICK-NECKS INC.

"AEROSCRIBE" considers Spotting not to be what it was. I agree. Let's drop the ghastly appellation for a start. It has always seared a sensitive nerve when friends, discovering me in a quiet garden nook with uptrained glasses, scream "Oh look, he's *Spotting*!" then, to my wife, "has he been like it for long?"

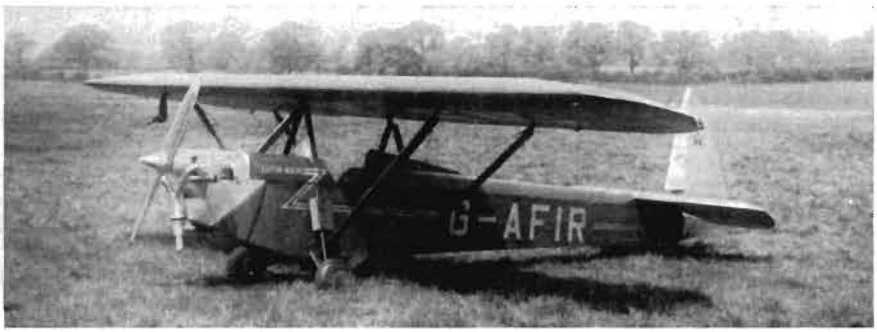
The word is reminiscent of measles; a rash word having unfortunate association with the delinquent Butler of Pier-side fame. It belittles the skill of us all by implication. We are not Peepers, Gapers, or Coolookers, we are Observers, needing skill, training, 6/6 eyesight, patience and forbearance beyond the average.

Then let us take the opportunity provided by "Aeroscribe" to raise the status of our select fraternity by striking Spotter from our vocabulary, our escutcheons, and our memories for ever.

In its place? A sneering friend suggested Kite-Hawks—at least I think that's what it was—but I consider it too theatrical. Crick-Necks appeals to me. It has a transatlantic note perhaps, but is also full of glorious understatement. It is simple and accurate and at the same time wonderfully obtuse to the non-initiates.

May I than look forward to the Journal of a Roving Crick-Neck, and the damnation of Spotting for ever and ever?—**P. Wescombe, Worthing, Sussex.**

The superb finish of G-AFIR is evident in this photograph, sent in by A. W. J. G. Hume of Pinner, Middx.



A MYSTERY NO MORE

THE Hungarian registered (HA-UBI) biplane illustrated on page 198 of the June issue of *Air Pictorial* is the German B.F.W. (Udet) U.12 Flamingo.

This two-seat training biplane was built in 1929 by Bayerische Flugzergwerke at Augsberg to the designs of Ernst Udet (before Uisserschmitt joined the Company as Chief Engineer). The machine was constructed mainly of wood, the fuselage being covered with plywood. The wings, which were of equal span, were staggered and were supported by rugged centre-section and interplane struts. These struts were of stressed duralumin, presumably to withstand a deal of knocking about.

The engine was a 95-h.p. Siemens Sh 11 radial mounted on a detachable steel tube mounting. Other details were: Span 32 ft 10 in.; length 24 ft. 7 in.; weight empty 1,155 lb.; loaded 1,760 lb.; maximum speed 84 m.p.h. Variant was the U-12a powered by a 125-h.p. Siemens Sh 12 which gave a top speed of 90 m.p.h.

I believe Udet used a Flamingo whilst giving demonstrations throughout the U.S.A. in the mid-'thirties. I recollect seeing a photograph showing him picking up a handkerchief from the ground by a hook on one wingtip.

Incidentally, the Bayerische Flugzergwerke was the successor of the Udet Flugzengban of Unenchen, which ceased to exist in 1926 after taking over the former works of the Bayererische Rumpler Werke of Augsberg.—**H. Parrish, Manchester, 2.**

(*Many thanks to readers who supplied additional information on the Udet Flamingo.*—ED.)

WORLD CRUISER GEN

WITH reference to your May issue and the article and drawing of the Douglas World Cruiser, the following details of colouring may be of interest to scale modellers. In the main they are taken from an article by Henry Struck which appeared in

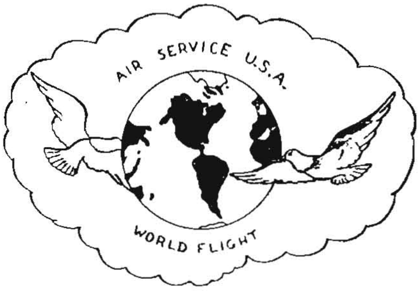
(*Continued overleaf*

LETTERS *(Continued)*

the May 1939 issue of the American magazine *Flying Aces* and I have checked them, so far as I have been able, with photographs and comments of the actual flight period.

The wings and fuselage as far as the back of the rear cockpit were silver, aft of the rear cockpit, including the empannage was olive drab. From photographs all struts also appear to have been olive drab. The normal National Insignia as indicated on your drawing was carried, the red centred, five-pointed blue star superimposed on a white disc above the upper plane and below the lower, the red, white and blue rudder stripes in that order from the rudder post.

The Special Flight insignia is not quite correctly shown and this drawing will help the keen aeromodeller. I have no definite information as to the correct colours and although it is hard to judge colours from photographs I feel that black on white would not be far wrong. The aircraft name was in black and its number white, the crew members' names appearing in black—approximately two inches high—below the rim of their respective cockpits. In the case of "Seattle" Martin and Harvey occupied the front and rear cockpits respectively. Incidentally Lowell Thomas's book *The First World Flight* names the crew of "Chicago" as Lt. L. H. Smith and Lt. L. P. Arnold—not Smith and Turner as given in your article. All of these Special Flight insignia appeared on both sides of the fuselage.



Two points for modellers which are apparent from photographs but not from your drawing are (*a*) that the engine cylinders are clearly visible beneath the upper cowling and (*b*) the alternative exhaust arrangement of a short single pipe from each cylinder.—**S. D. Stock, London, S.W.12.**

RHODESIAN HARTS

I READ with interest Mr. Bruce Robertson's article on Rhodesian Military Serials in the April issue of *Air Pictorial*, and in it he states that the six Hawker Harts, serialled K2986, K3025, K3028, K3888 and K3889, delivered during 1937, were to be renumbered SR1 to SR6.

K3888 did not carry the serial SR5 as might have been expected, but during 1942–44 was 102 in the Rhodesian Air Training Group, a serial which was understood to be that of the Southern Rhodesian Air Force as it was then known.

In 1942–43 this Hart (102) was used on a tri-weekly "met" flight from Belvedere, Salisbury, S.R., and in 1943 had her last major overhaul at Mount Hampden. Built by Armstrong-Whitworth in 1934, 102 survived in Rhodesia until 1944 when, with the advent of surplus Hurricanes "from the north" (as North Africa was always known in S.R.), it was dismantled. At the same time a Gloster Gauntlet, on which nobody would try the magnetos before flight, owing to the terrific drop occasioned thereby—so it was said, was also dismantled.

With regard to the "un-prefixed" Tiger Moths I would like to get to the bottom of this. It was generally thought, as Mr. Robertson states, that the prefix-letters were painted out, but I do not subscribe to this for two reasons. Firstly, those Tiger Moths which arrived at Mount Hampden were brand new and there was no sign of the prefixes being painted out, and secondly the far more important fact is that we had 544 and DX544 at the same time.

As regards "MC" prefixes, there was certainly none of these at Mount Hampden. DX544, or to be more correct, the rear half of the fuselage and tail section of DX544, made up a rebuild of a Portuguese East African Tiger Moth CR-AGG in 1942, the front half of DX544 having been badly damaged in an accident.—**C. A. Nepean Bishop, Thornton Heath, Surrey.**

MORE DVII EVIDENCE

I WAS pleased to see Peter Grosz's letter in the June *Air Pictorial*, and am sure that the information on the Fokker DVII will be useful to many readers.

As luck would have it, I received a copy of the photograph which you reproduced, between the writing and printing of my own letter. One of those coincidences which are inseparable from gen-gathering, I suppose!

My own print is much clearer, and close investigation would seem to bear out Mr. Grosz's and my own conclusions that the aircraft is an early prototype. The armament is visible, but there is no service acceptance number, which leads one to think that the aircraft was still company property at the time this photograph was taken.

The remarks concerning the correctness of the Mantz aircraft marking were directed at the crosses only of course, and not to the whole aircraft. It is actually all red background, with a black nose and serial. Latin crosses are carried on both wings.

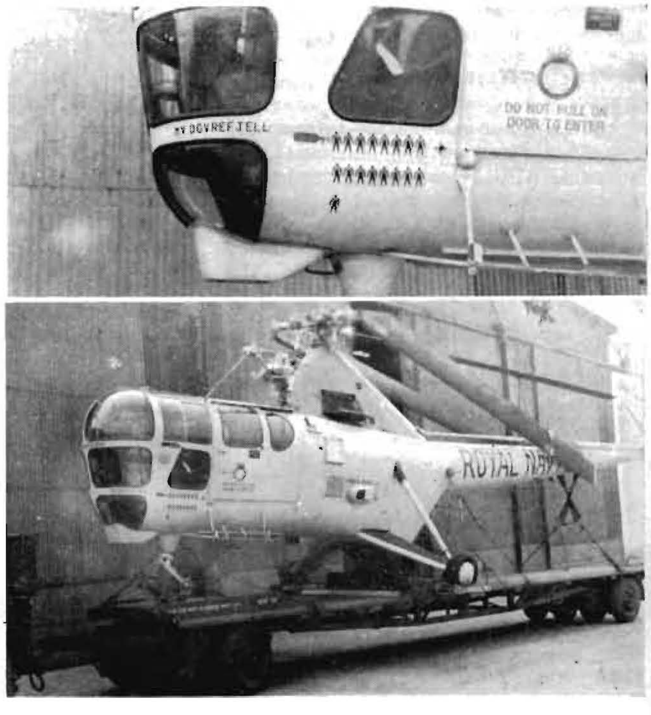
There are plenty of photographs of DVIIs available which show the whole rudder and fin painted white as Mr. Grosz mentions, and several which show the fin, ahead of the extreme forward edge of the rudder, camouflaged in accordance with the rest of the fuselage.

One interesting photograph, for the fastidious observer, is of a DVII with the serial 7756/18. On this aircraft either the fin or the rudder has been changed, and the forward bar of the cross does not align correctly, giving an interesting effect! Also to be noted, is the proximity of this serial to that of the Mantz aircraft, though this latter may not be the original.

The variety of crosses applied to these aircraft was wide, including the normal type with thin white outline; the cross on a complete white panel, and with a broad white outline all the way round, including the ends of the arms, not to mention the more obscure examples. Page 20 of *Camouflage '14–'18 Aircraft* shows a DVII with a crucifix-type cross on the rudder (i.e. one with a very long lower vertical arm).

Some day, a dusty dossier may be unearthed which will give the full story of all this, but at the moment it looks as if we will all be very, very old enthusiasts when this happens.—**Frank Yeoman, West Hartlepool.**

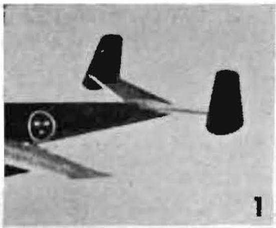
LIFE SAVER



During the last war, aircraft of Bomber Command had their sorties recorded by a bomb painted on the nose, while Fighter Command's method was a Swastika for every enemy aircraft destroyed. The Royal Navy appear to have adopted this scoreboard method for their rescue helicopters. For every person saved an image of a man is painted on the nose of their machines. I took these photographs at the R.N.A.S. Station at Abbotsinch, and this particular helicopter was one of those used to rescue forty-one men from the motor-vessel *Doverfjell*. Note folded rotors.—**A. Young, Glasgow, C.3.**

"Spotting Mixture"

(For answers see page 292)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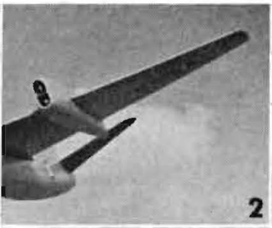
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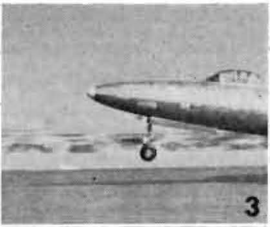
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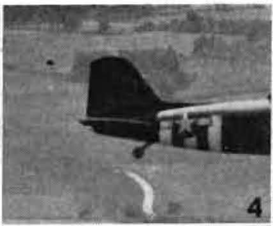
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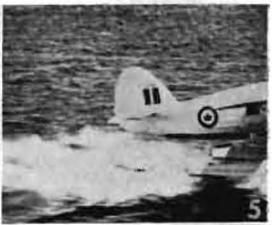
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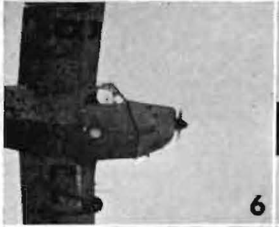
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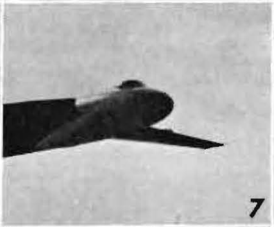
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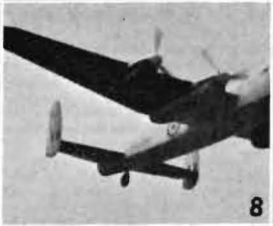
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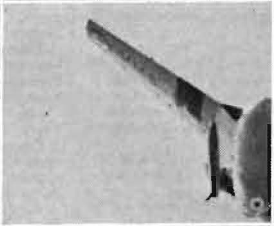

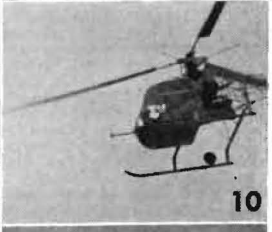
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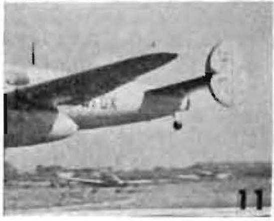
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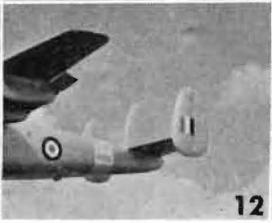
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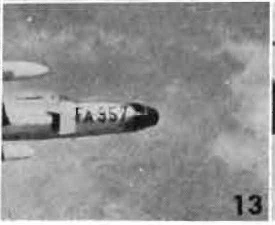
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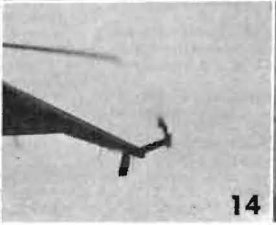
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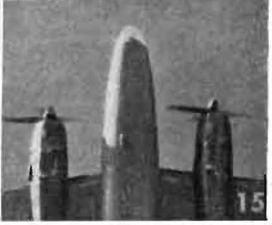
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BRITISH REGISTRATIONS IDENTIFIED

by F. A. Hudson, British Civil register specialist of Registration Research

G-EBKZ	D.H.50A (c/n. 133); Imperial Airways; crashed at Plymouth 23/10/28
G-ADOK	Tiger Moth (c/n. 3404); Autocars (Worcester) Ltd.; sold as PH-UEX 1951
G-AEFT	Aeronca C.3 (c/n. A610); H. Dodd, Newcastle; currently registered
G-AEWL	Dragon Rapide (c/n. 6367); Aviation Supplies Co., Hounslow; sold to France
G-AGOD	York C.1 (c/n. 1231, ex-TS 806); Skyways Ltd.; used serials WW576, WW577 while trooping; sold as EP-ADC
G-AGWI	Lancastrian 3 (c/n. 1281); B.S.A.A.C. "Star Land"; sold to Flight Refuelling Ltd. and broken up at Tarrant Rushton 1951
G-AHLV	York C.1 (c/n. 1340); Skyways Ltd.; withdrawn at Stansted 1952
G-AIDV	Tiger Moth (ex-T5832); Herts & Essex Aero Club (1946) Ltd.; broken up at Broxbourne 1954
G-AIVI	Viking 1B (c/n. 222); First Air Trading Co.; sold to Germany
G-AIVM	Viking 1B (c/n. 226); B.E.A.C.; sold to Germany
G-AJEC	Autocrat (c/n. 2327); P. M. E. Whittome & Sons; sold as ZK-BJL
G-AJKW	Dragon Rapide (ex-X7379); Lancs. Aircraft Corp.; currently registered
G-AJNF	Consul (ex-HN847); R. K. Dundas Ltd.; sold as VT-CRG
G-AJWL	Gemini IA (c/n. 6460); Air Charter Ltd.; sold as OO-ODR
G-AKIT	Proctor 5 (c/n. AE128); Thomas Barclay Ltd.; sold abroad
G-AMJI	Bristol 173 (c/n. 12872); Ministry of Supply to R.A.F. as XH379 1954
G-AMMR	Aiglet (c/n. 2744); Aerial Spraying Contractors Ltd.; currently registered
G-AMXR	Dove 2B (ex-N4280c, c/n. 04379); de Havilland Aircraft Co. Ltd.; sold as D-IFSB and later re-registered as D-CFSB
G-ANVL	Beech C.18S Expeditor (c/n. 6395, ex-N714A); Airwork Ltd.; sold to France
G-AIAN	Halifax 8 (ex-PP271); B.O.A.C.; returned to R.A.F.
G-AKNF	Dragon Rapide 4 (c/n. 6518, ex-X7345); Airwork Ltd.; sold to Persia 1955
G-ANGL	York C.1 (ex-MW231); Skyways Ltd.; sold to Persia

FOREIGN REGISTRATIONS IDENTIFIED

by F/Lt. D. A. S. McKay, D.F.M., overseas civil register specialist of Air-Britain

CCCP-Л1816	Ilyushin IL-12; Aeroflot
CF-EJO	Cessna 170B (c/n. 25434); Wenger Lumber Co. Ltd.
CF-ODM	Bell 47D-1 (c/n. 665–8); Spartan Air Services Ltd.
CH-167	Lockheed Orion (c/n. 189, ex-NC-12231); Swissair A. G. (re-registered HB-LAH)
D-ECAN	Focke-Wulf FW44J Stieglitz (c/n. 667, ex-SE-BWN); J. C. Pracht
D-ELYM	Auster Autocrat (c/n. 1880, ex-G-AGWY); Musterring Möbel G.m.b.H.
D-ENAS	Piper Cub (c/n. 12033, ex-44-79737); Deutsche Luftwerbung C. H. Vollhardt
EI-AFP	Bristol Freighter 31 (c/n. 12827, ex-G-AINL and WJ320); Aer Lingus (returned to U.K. as G-AINL)
EI-AGF	Miles Gemini 1a (c/n. 6291, ex-G-AJWF); J. Kelly (returned to U.K. as G-AJWF)
EI-AGJ	Auster Autocrat (c/n. 2208, ex-G-AIPZ); Mrs. E. Fitzgerald Morgan
F-BATF	Stampe S.V.4C (c/n. 42); Aéro-Club de l'Ecole Navale
F-BAXG	Douglas DC-3 (c/n. 13142, ex-42-93251); Air France
F-BDRA	Latécoère 631 (c/n. 4); Air France (cancelled)
F-BELV	Boeing SA-307-B1 (c/n. 1996, ex-N-1941, 42-88628, NC-19905); Aigle-Azur Indochine
F-WASL	Bréguet 76-1S (c/n. 2); Louis Bréguet (re-registered F-BASL)
F-WFUN	Nord 2501 Noratlas (c/n. 01); N.2501 prototype
F-ZWSA	Potez 75 (c/n. 01); prototype (re-registered F-WGVK)
HB-AET	Pilatus P.4 (c/n. 1); Pilatus Flugzeugwerke A.G.
I-FIAT	This registration marking has been carried by several Fiat prototypes, including the G.2, G.46ter and G.49-2 (the latest)
OO-ULA	Tipsy Junior (c/n. J.111); Ernest Tips (re-registered G-AMVK)
PH-CGA	Convair 340-48 (c/n. 173); Koninklijke Luchtvaart Maatschappij (K.L.M.) "Jan van Eyck"
PK-GHC	D.H. Heron 1 (c/n. 14016); Garuda Indonesian Airways
SP-GIL	Glowny Instytut Lotnictwa prototype
TC-HAK	D.H. Heron 2 (c/n. 14056); Devlet Hava Yollari (Turkish Airlines)
VH-UUA	D.H.86A (c/n. 2306, ex-G-ACWE); Qantas Empire Airways "Adelaide" (sold to India as VT-AKM)
YV-C-AMZ	Vickers 749 Viscount (c/n. 96); Linea Aeropostal Venezolana
ZS-BMH	Douglas DC-4 (c/n. 43157); South African Airways "Lebombo"

INFORMATION WANTED

Serials of F-84Fs FS-712, 728, 711 and whereabouts o Canberras WH911, WF886 and Lincolns WD130, SX947.—C. H. Hagger, 2 The Ridgeway, Gidea Park, Romford, Essex.

Report of Battle of Britain display at R.A.F. Wattisham, including serials and mark numbers of all aircraft appearing.—Brian Cull, 9 Acacia Avenue, Mildenhall Estate, Bury St. Edmunds, Suffolk.

Details of Chipmunks used by R.A.F. Training Command, Bristol Blenheim 1, Lancaster B Mk. 3, and Halifax 3.—L. Thompson, Pukepoto Road, Kaitaia, Northland, New Zealand.

Serials and code numbers of the aircraft appearing in Open Day at R.A.F. Turnhouse.—I. G. Scott, 576 Queensferry Road, Barnton, Midlothian.

Plans, any scale, and photos of Curtiss P6-E, F11C-4, BF2C-1, F9C-2, SOC-1. Loaned material returned in perfect condition.—J. Marshall, 130 Auckland Road, London, S.E.19.

Details of Me 109F and Fw 190. Camouflage, cockpit details and code markings.—P. Arnold, Wryley, 108 Ashley Road, Newmarket, Cambs.

Address of Mr. H. P. Newton, a New Zealand aviator, who flew an "Ercoupe" solo across the Tasman Sea in October 1947. Also the colour schemes, registration letters or numbers and photographs of this plane. History of the Bellanca Model 28-70 last known to have carried the British Civil Register letters of G-AEPC.—G. C. Kohn, 3944 N. 67th Street, Milwaukee 16, Wisconsin, U.S.A.

Details of London to Cardiff races and aircraft and pilots taking part.—K. Westmacott, Rookery Farm, Brinkworth, Chippenham, Wilts.

Civil registrations of DE419, DE601, DE712, RJ111, EM903, LZ734, MX452, BB720, DF186, DF184.—C. C. Spencer, 72 Reading Road, Woodley, Berks.

WANTS, DISPOSALS AND EXCHANGES

Wants

Aeroplane Spotters, *Air Britain Digest*, and books on aircraft camouflage, English or German.—S. Hubbal, 47 Grange Road, Old Hill, Staffs.

Milestones, Vol. I, and the *Aeroplane*, 15th April 1955. Exchange *Aeroplane*, 27th May 1955, for *Aeroplane*, 15th April 1955.—Quinet Jules, 76 Chaussee de Nivelles, Gosselies, Belgium.

Aircraft of the Fighting Powers, Vols. 6 and 7.—J. M. Hunter, 164 Northfield Road, Crookes, Sheffield W., Yorks.

(Continued overleaf)

WANTS, DISPOSALS, ETC.

(Continued from previous page)

1/72nd scale models of Proctor, Gemini, Rapide and Anson.—D. Allison, 8 The Green, Ponteland, Newcastle-upon-Tyne.

Correspondents in all countries interested in exchanging photographs, negatives and information.—B. T. Gibbins, 63 Spruce Hills Road, Walthamstow, London, E.17.

Indexes for *Aeroplane Spotter*, Vols. V to IX.—K. F. Hopkins, 14 Western Avenue, R.A.F. Henlow, Beds.

Any volume of *Aircraft of the Fighting Powers*.—E. R. Daires, 7 Queen Street, Aberystwyth, Cardiff.

Vols. I to VII *Aircraft of the Fighting Powers*, any condition. Also any pre-war *Observers' Books of Aircraft*. Will buy or part-exchange with *The Aircraft of the World* (1953 Edition) and *British Aircraft*, Vol. I (Saville Sneath).—Offers A. R. Jefferies, Moortown, Curry-Rivel, Langport, Somerset.

Photographs of Mosquito PR34s, Anson 19s, Meteor 7 WL366 or Tiger Moth N9449, of No. 58 Squadron; Tiger Moths of 3 E.F.T.S. Shellingford; Tiger Moths and Harvards of 3 F.T.S. Feltwell; Proctor 4s, NP157 or NP328, of No. 54 Group Comm. Flight, and Oxfords of 10 A.F.T.S. Pershore.—David F. Ogilvy, Elstree Flying Club, Elstree Aerodrome, Herts.

Air Reserve Gazette, Feb. 1947. *Air Pictorial*, Aug., Sept., Oct. '52, Jan. to May and Aug. '53.—P. G. Wright, 5 Cornfield Road, Eastbourne, Sussex.

Any photographs, cuttings, etc., of B-17s. Will pay cost.—Harry Holmes, 8 Coleridge Avenue, Boarshaw, Middleton, Manchester.

All issues of the *Observers' Book of Aircraft* between 1940 and 1946. Will pay postage on same to Australia.—R. J. Lyons, 110 Charles Street, North Rockhampton, Central Queensland, Australia.

Copy of *Solid Scale Model Aircraft*, state price.—B. Wheeler, 97 Woodstock Road, Scotswood, Newcastle-upon-Tyne, 5.

Prints or loan of negatives (120 size or smaller) of any type of American jet or of any small liaison aircraft now in service with U.S. Army.—J. B. Atwell, 68 Yokermill Road, Clydebank, Glasgow.

Wanted in good condition *The Book of Bristol Aircraft, The Book of Westland Aircraft* and *Book of Miles Aircraft*.—K. E. Wixey, 8 Spenser Avenue, St. Marks, Cheltenham, Glos.

Press cuttings about the 617 Squadron (*The Dam Busters*) also photographs and information of any members of the above Squadron, especially the late Guy Gibson, V.C., and "Micky" Martin.—14 Ascot Cresent, Bensham, Gateshead, 8, Co. Durham.

Photographs and cuttings of R.A.F. fighter pilots of World War II. Please state price and whether willing to correspond. Serial numbers of fighter aircraft used by famous pilots of World War II.—Brian Cull, 9 Acacia Avenue, Mildenhall Estate, Bury St. Edmunds, Suffolk.

Air Pictorial for Jan. 1953.—M. G. Hook, Greenlawns Farm, Charlwood Road, Horley, Surrey.

Flight and *Aeroplane* containing S.B.A.C. Farnborough show of 1950.—G. Hudson, 6 Brook Road, Cricklewood, London, N.W.2.

Fighting Planes of the World (Sargent). Information of Grumman and Curtiss aircraft built before World War I.—A. D. King, 38 Warrender Park Road, Edinburgh, 9.

Vols. 1–4 inclusive *A.F.P.*, also similar publications. State prices.—J. Prendergast, 30 Dawson St., Bairnsdale, Victoria, Australia.

Colour schemes and markings of D.H.91s, *Flight* index, Jan.-June 1951 and Jan.-June 1955.—T. Cottle, 1 Mead Way, Fareham, Hants.

Revised edition of *Aircraft of the Fighting Powers*, Vol. I published *circa* 1947, also *Camouflage of 1943–45 Aircraft* published by Harborough 1946 or 1947. State condition and price.—R. Wilson, 56a Bellshill Road, Uddingsten, Glasgow.

Disposals

Seven issues *Aeroplane* 1948–49; *Aeroplane Spotter* Jan.-Dec. 1946; *Aircraft of World*, 1st edition; *Jane's A.W.A.* 1945–46; *Air Pictorial*, May–December 1950, Jan.–December 1951, Jan.–December 1953, also 1954 less August and December. For disposal or exchange. Offers.—H. J. Blott, 17 Clarendon Gardens, Wembley, Middx.

Air Pictorial, June 1951–present (except Feb.–Mar. 1953); fifty copies *Flight*, *Aeroplane*, *R.A.F. Review*; *Observer's Book of Aircraft* 1949, 1952, 1954; *Aircraft of the World*; thirty 1/22nd scale plans; 100 photographs; many other journals, books, etc.; also Spotter's Telescope. All in superb condition. S.A.E. for lists.—A. F. Brant, 25 Corsica Street, Highbury, London, N.5.

Air Pictorials, June 1952–Jan. 1955; *Air Britain BRCN*, all of Vol. 8; Ian Allan, *A.B.C. Military Aircraft*, 1952 and 1953; *A.B.C. Civil Aircraft* 1953; All offers to M. B. West, 9 Hardwicke Road, Ham, Richmond, Surrey.

Thirty-three copies *American Aviation*, Dec. 1954 to Feb. 1956, good condition £1. Bulk sale only.—M. H. Perry, 26A Kenilworth Road, Leamington Spa, Warwick.

Air Pictorial, 1954 with index, and 1955.—R. H, Parry, 31 Armscot Close, Speke, Liverpool, 19.

Collection of books, magazines, etc., including *Aircraft of the Fighting Powers*, Vols. 1–7, *Air Pictorial*, *Aeronautics*, *R.A.F. Flying Review*. S.A.E. for full list.—Ricks, 16 Forty Lane, Wembley, Middx., ARN 3648.

Aviation Today: its History and Development by J. L. Nayler and E. Ower, F.R.Ae.S., printed in 1930 (price then 15s.). A really first-class book for sale, the highest offer takes it.—E. N. Brumby, 1 P.O. Cottages, Gunthorpe, Peterborough.

Will sell or exchange for any *Aircraft of the Fighting Powers* or *Jane's A.W.A.*, 1940–45, *Flight*, 27/3/53 to 9/4/54 (about fifty copies; not complete), *British Aviation*, 1953, *Coastal Command* and *Bomber Command*. Offers.—T. Edmundson, 35 Parkhurst Road, Wood Green, N.22.

Exchange

Fifty photographs of various aircraft for any *Jane's A.W.A.*, or offers.—Raymond Reynolds, 102 Grantham Street, Kensington, Liverpool 6.

Will exchange *Letters from a Flying Officer, Into the Blue, War Birds, Above the Bright Blue Sky, With the Earth Beneath, Double Decker C.666, The Red Knight of Germany, One Man's War, Pilot Tex, Listen the Wind, Squadron of Death, Around the World in 8 Days, Nine Lives, Wings of War, The German Air Force, 30 Seconds Over Tokyo, Flames in the Sky, The Big Show, Spitfire Pilot, Bomber Pilot, The Last Enemy, Skyways to Berlin, Combat Report, Enemy Coast Ahead* and *Squadron 303* for any post-war Lloyd's Register of Shipping.—F. F. Hawkins, 123 Kesteven Road, Stamford, Lincs.

Victory Through Air Power, Warriors of the Skies and *Coastal Command* for any edition of *Aircraft of the World* after 1953.—James Fraser, 13 St. Valery Avenue, Dalneigh, Inverness.

ANSWERS TO "SPOTTING MIXTURE"

(See page 291)

1. S.A.A.B. B-18B; 2. Short Sperrin; 3. S.O.6025 Espandon; 4. Douglas C-47 Dakota (Skytrain); 5. Noordyn Norseman; 6. Nord NC-853; 7. Vickers Valiant Mk. 2; 8. Avro Lancaster B.3; 9. de Havilland Venom FB.1; 10. S.E.3120 Alouette I; 11. Rey R.1; 12. Miles Marathon T.11; 13. Lockheed F-94C Starfire; 14. Sikorsky S.55; 15. Martin B.26 Marauder.

ERRATA

Photographs No. 4 and No. 12 in "Tops, Tips and Tails", on page 255 of the July issue, were an S.A.A.B. B-18B and a Lockheed T-33A respectively, and not an S.A.A.B. B-17B and Lockheed F-94C Starfire as published.

R.A.F.
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Squadron, Royal Observer Corps and A.T.C. Badges in Silk and in Gold Wire.
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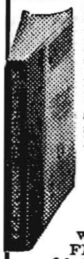

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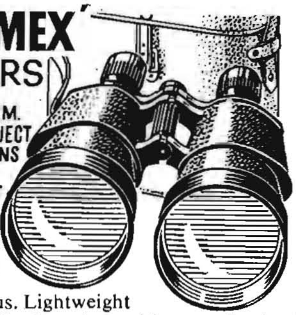

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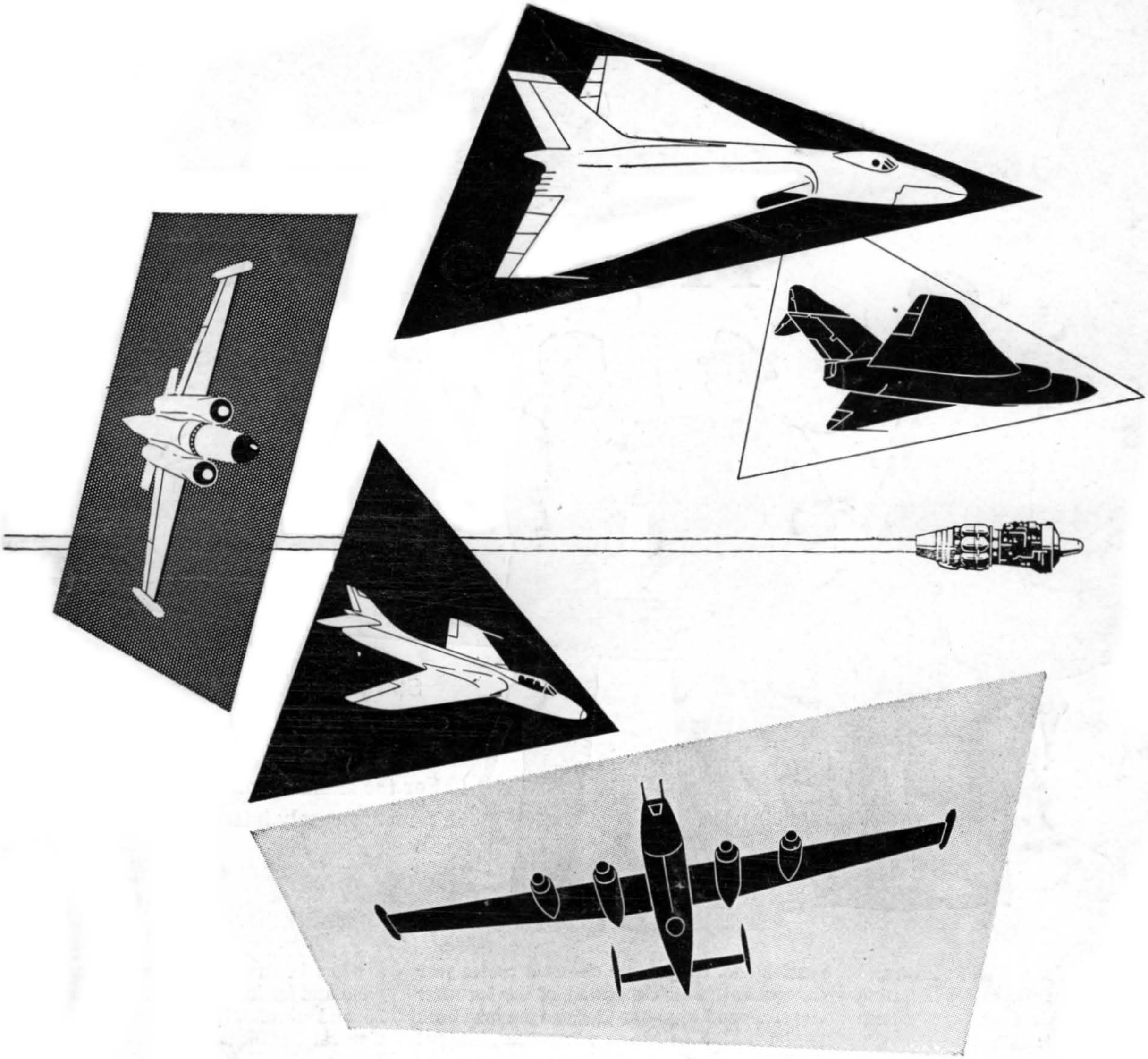

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